Fire and Police Pension Association

Statewide Death & Disability Plan

Actuarial Valuation Report
for the Year Beginning January 1, 2021

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June 30, 2021

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, 2021

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, 2021.

We certify that the information included herein and contained in our 2021 Actuarial Valuation Report is accurate and fairly presents the actuarial position of the FPPA Statewide Death & Disability Plan as of January 1, 2021.

Our report presents the results of the January 1, 2021 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, 2021, the Plan has current liabilities greater than current assets by $142.2 million assuming no allowance for future discretionary benefit

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adjustments for non-totally disabled benefit recipients. This does not take into account any increases beyond the 3.0% level which the Board may adopt starting in 2022.

House Bill 20-1044 automatically increased the rates to 3.00% starting in 2021. Based on smoothed assets, the cost of providing benefits is 4.23%, 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 from 3.00% in 2021 to 3.20% in 2022. We recommend that the Board continue these maximum increases at least until the actuarial rate is met.

Benefit provisions

All of the benefit provisions reflected in this valuation are those which were in effect on January 1, 2021. 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, 2021. 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, 2021.

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 2021 are based on the same assumptions, methods and provisions used for the January 1, 2021 valuation. The projections assume the Board will utilize the maximum 0.2% contribution increase each year until the Annual Required Contribution is met or exceeded.

5-Year Deterministic Projection						
January 1,	Market Value Investment Return					
	3.00%		7.00%		11.00%	
	FR	ARC	FR	ARC	FR	ARC
2021	76.5%	4.23%	76.5%	4.23%	76.5%	4.23%
2022	79.0%	4.24%	79.8%	4.20%	80.5%	4.17%
2023	81.2%	4.32%	83.8%	4.19%	85.7%	4.10%
2024	83.1%	4.41%	88.2%	4.17%	92.3%	3.97%
2025	84.8%	4.52%	92.7%	4.15%	99.9%	3.80%
2026	86.3%	4.63%	97.0%	4.14%	103.8%	3.62%

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

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SECTION I

EXECUTIVE SUMMARY

Executive Summary

Item	January 1, 2021	January 1, 2020
Membership		
• Number of:		
- Active members	13,402	13,283
- Total disabled members & beneficiaries	167	162
- Occupational disabled members & beneficiaries	1,028	987
- Survivors of deceased active members	134	135
- Total	14,731	14,567
• Annualized payroll supplied by FPPA	$ 1,168,873	$ 1,112,893
Contribution rates for members hired on or after January 1, 1997 and members covered by Social Security	3.00%	2.80%
Assets		
• Market value	$ 493,253	$ 442,442
• Actuarial value	$ 463,247	$ 432,227
• Rate of return on market value	13.2%	14.4%
• Rate of return on actuarial value	8.9%	7.6%
• Contribution for prior year	$ 29,030	$ 26,150
• Ratio of actuarial value to market value	93.9%	97.7%
Actuarial Information		
• Unfunded actuarial accrued liability/(surplus)	$ 142,209	$ 166,602
• GASB funded ratio (3.0%/2.8% Contributions)	76.5%	72.2%

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 3.0% as of January 1, 2021. House Bill 20-1044 allows the Board to increase contributions by up to 0.20% per year. We recommend that the Board maximize use of the contribution flexibility granted by the House Bill and increase rates from 3.00% in 2021 to 3.20% in 2022. We recommend that the Board continue these maximum increases at least until the actuarial rate is met.

2. The number of total members increased from 14,567 in 2020 to 14,731 in 2021, an increase of 1.1%.

3. 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 3.0% contribution rate is inadequate to provide any permanent annual benefit adjustment.

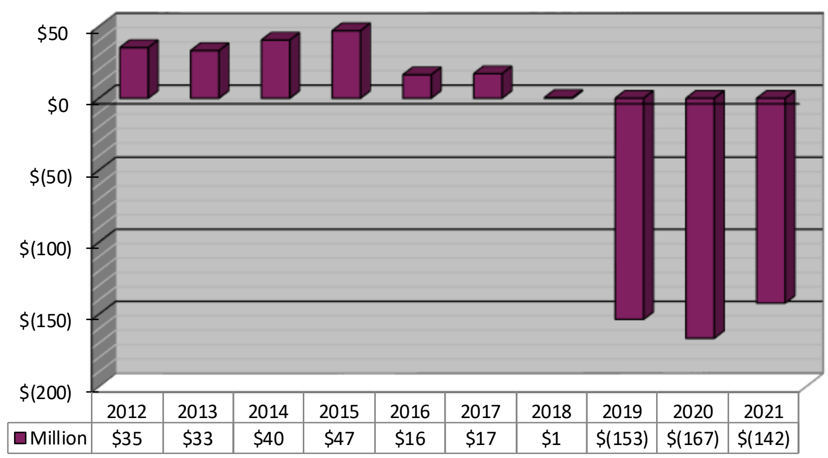
4. The present value of future benefits and expenses at the valuation date is in excess of the plan assets and the present value of future contributions by $142.2 million. This unfunded position compares to the $166.6 million unfunded position last year. The Plan is “unfunded” assuming no future discretionary benefit adjustments for non-totally disabled benefit recipients.

5. Assets earned 13.2% on a market basis and 8.9% on an actuarial basis in 2020, producing an actuarial gain of $8.1 million.

8. The funded ratio increased from 72.2% to 76.5% as of January 1, 2021.

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



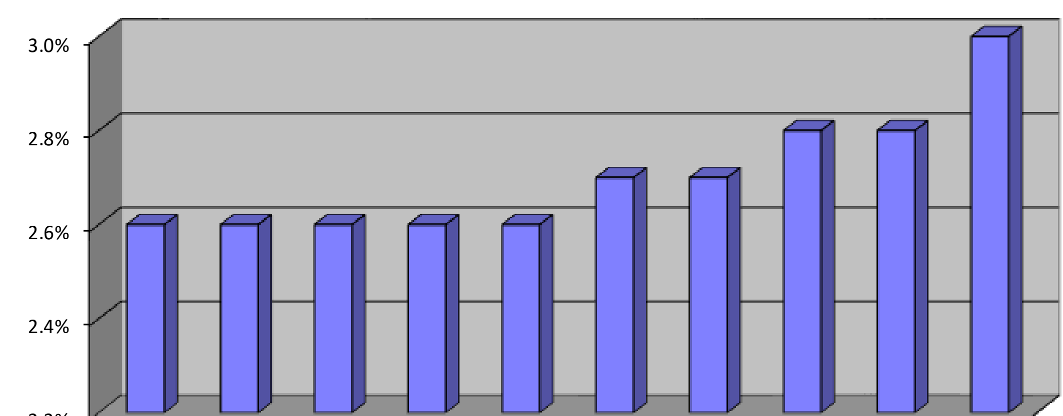
SECTION II

DISCUSSION

Contribution Requirements

The valuation of the Fire and Police Pension Association Statewide Death & Disability Plan (D&D) as of January 1, 2021, reflects a current employee contribution rate of 3.0% for members hired on or after January 1, 1997. House Bill 20-1044 allows the Board to increase the annual contribution rate by as much as 0.2% every year.

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

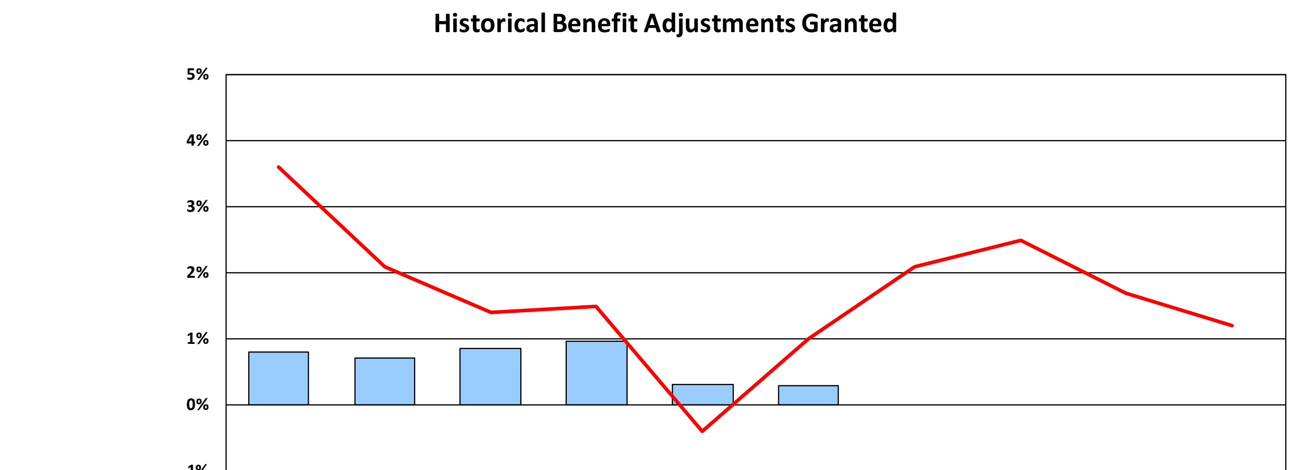


	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
■	2.6%	2.6%	2.6%	2.6%	2.6%	2.7%	2.7%	2.8%	2.8%	3.0%

The cost of providing benefits is 4.23% (with no future benefit adjustments for non-totally disabled benefit recipients), therefore, the current 3.0% contribution rate is inadequate to provide any level of future benefit adjustments, or even to fund base benefits. House Bill 20-1044 automatically increased the contribution rate to 3.0% effective January 1, 2021, and allows 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 3.0% 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.



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Granted Adjustment*	0.80%	0.70%	0.86%	0.96%	0.30%	0.29%	0.00%	0.00%	0.00%	0.00%
Prior Year CPI-W	3.60%	2.10%	1.40%	1.50%	-0.40%	1.00%	2.10%	2.50%	1.70%	1.20%

**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, 2021. The market value of assets reported was $493.3 million as of January 1, 2021, as compared to $442.4 million as of January 1, 2020. 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.

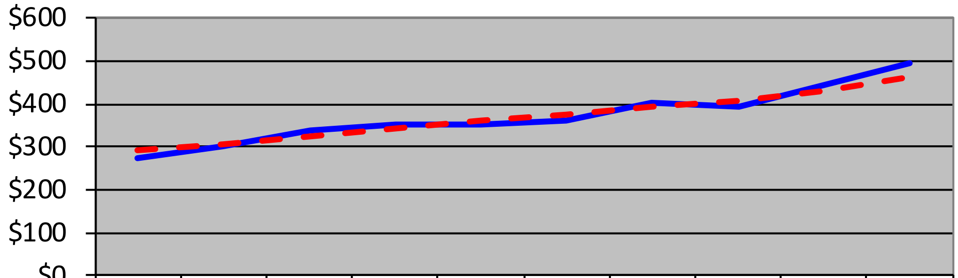
The asset valuation method uses a five-year phase in of the excess/(shortfall) between expected investment return and actual income. Expected earnings used to project the actuarial value are determined using the assumed investment return rate and the beginning of year actuarial value of assets (adjusted 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 $432.2 million to $463.2 million since the prior valuation. This increase was more than expected and produced a gain of approximately $8.1 million.

As indicated by item 6b of Table 8, the estimated return on mean market value was 13.20% in 2020; higher than the assumed 7.0% return. The actuarial asset value returned 8.90%. 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,



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
MVA	$276	$302	$339	$354	$352	$361	$404	$394	$442	$493
AVA	$291	$305	$325	$345	$361	$375	$395	$409	$432	$463

$ in millions

MVA AVA

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

Demographic Experience

During the year, the plan had less disablements than expected (50 actual vs. 69.2 expected) and less active member deaths than expected (7 actual vs. 8.4 expected). The plan had more annuitant deaths than expected (22 actual vs. 18.6 expected). The primary component of the liability gain shown in Table 3 is from less disablements than expected.

Member Data

FPPA supplied member data as of January 1, 2021. 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.

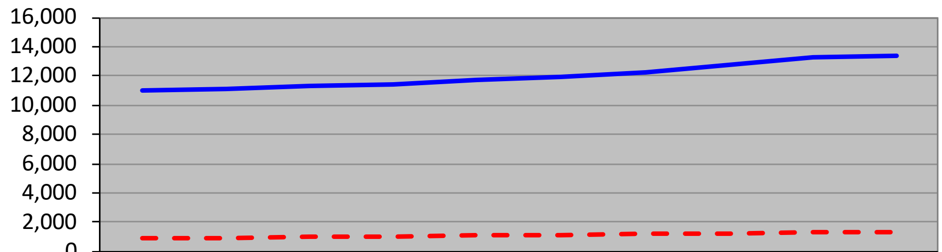
For local Money Purchase members, an array based on service was used to estimate each member's Money Purchase balance. For missing salary in the data, an array of salaries based on service was used to estimate the salary.

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,



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Active	10,958	11,076	11,341	11,391	11,681	11,975	12,214	12,747	13,283	13,402
In Payment	881	928	968	1,020	1,063	1,111	1,185	1,238	1,284	1,329

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 3.0% 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

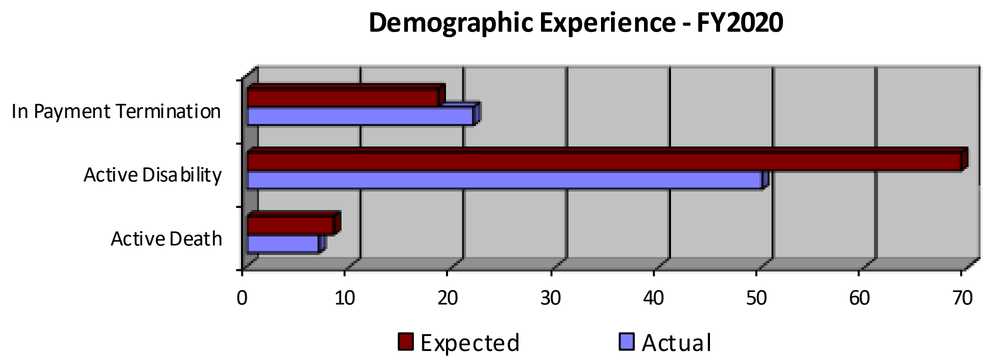
The valuation was prepared using the Aggregate Method. This is the same funding method that has been used in prior years. The asset valuation method uses a five-year phase in of the excess (shortfall) between expected investment return and actual income. See Appendix A for a complete description of this 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 FY2020, 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 assumptions.



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

GASB and Funding Progress

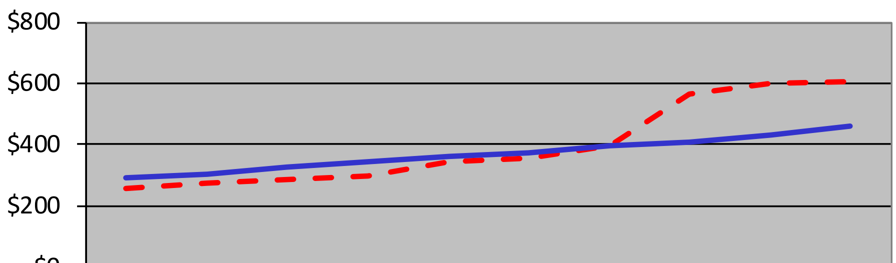
The governmental Accounting Standards Board (GASB) Statement No.74, *Financial Reporting for Postemployment Benefit Plans Other Than Pension Plans (GASB 74),* has replaced the requirements under GASB Statement No. 43, *Financial Reporting for Postemployment Benefit Plans Other Than Pension Plans (GASB 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 2020 is 0%. For members hired on or after 1/1/97 and for members covered by Social Security the member contribution rate is 3.0% of pay. The 3.0% became effective January 1, 2021.

History of AAL vs AVA

As of the valuation date January 1,



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
AAL	$256	$272	$285	$298	$345	$358	$395	$563	$599	$605
AVA	$291	$305	$325	$345	$361	$375	$395	$409	$432	$463

$ in millions

AAL AVA

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 starting with the actuarial valuation as of January 1, 2019. Strong investment returns during 2019 and 2020, coupled with positive demographic experience in 2020 have significantly improved the plan's funding position since then. If the Board maximizes the use of the contribution increases allowed, it is anticipated that the plan will be able to fund at a rate at or above the Actuarially Determined Contribution within the next five years.

Risk Metrics

The Statewide Death and Disability Plan provides death and disability benefits to members covered under the Statewide Defined Benefit 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%
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%
2021	41%	48%	4.23%	0.40%	85.7%	-8.6%

Market Value Results

Investment gains or losses are smoothed over five years, and currently, the smoothed or actuarial value of assets is 93.92% of the market value. If the Funded Ratio and Calculated Contribution had been measured using the Market Value of Assets, they would be 81.5% and 3.97% of payroll, respectively.

SECTION III

TABLES

Table 1 - Development of Unfunded Actuarial Accrued Liability

			January 1, 2021	January 1, 2020
1.		Covered payroll for upcoming year	$ 1,175,753,278	$ 1,143,563,487
2.		Present value of future pay		
	a.	Total	$ 11,860,770,043	$ 11,181,231,817
	b.	Contributory (Hired on or after January 1, 1997)	11,527,273,547	10,849,819,604
3.		Present value of benefits for active members		
	a.	Future occupational disabilities	$ 378,730,893	$ 360,754,487
	b.	Future total disabilities	67,578,476	63,915,842
	c.	Future active deaths	48,774,002	46,800,321
	d.	Total for actives	$ 495,083,371	$ 471,470,650
4.		Total present value of benefits		
	a.	Current disabled members	$ 396,024,904	$ 371,814,355
	b.	Current beneficiaries of deceased members	38,263,335	36,554,718
	c.	Active members (Item 3d)	495,083,371	471,470,650
	d.	Total	$ 929,371,610	$ 879,839,723
5.		Unfunded actuarial accrued liability (UAAL)/(surplus)		
	a.	Present value of benefits	$ 929,371,610	$ 879,839,723
	b.	Present value of administrative costs	21,901,820	22,784,621
	c.	Less present value of future contributions (3.0%/2.8%)	(345,818,206)	(303,794,949)
	d.	Less actuarial value of assets	(463,246,684)	(432,227,330)
	e.	UAAL/(surplus)	$ 142,208,539	$ 166,602,065
6.	a.	Current Contribution	3.00%	2.80%
	b.	Calculated Contribution (Aggregate Funding) [(5.a + 5.b + 5.d)/2.b]	4.23%	4.34%
	c.	Difference (a. - b.)	-1.23%	-1.54%

Table 2 - Actuarial Present Value of Future Benefits

		January 1, 2021	January 1, 2020
1.	Active members		
	a. Total disability	$ 67,578,476	$ 63,915,842
	b. Occupational disability	378,730,893	360,754,487
	c. Off-duty death	33,627,579	32,436,131
	d. On-duty death	15,146,423	14,364,190
	e. Total	$ 495,083,371	$ 471,470,650
2.	Members in pay status		
	a. Total disabled	$ 106,003,590	$ 100,306,717
	b. Occupationally disabled	290,021,314	271,507,638
	c. Survivors	38,263,335	36,554,718
	d. Total	$ 434,288,239	$ 408,369,073
3.	Total actuarial present value of future benefits	$ 929,371,610	$ 879,839,723

Table 3 - Actuarial Gain/(Loss) on UAAL

	For the year ending December 31,	2020	2019
1.	Unfunded actuarial accrued liability (UAAL) as of January 1	$ 166,602,066	$ 153,496,388
2.	Interest on UAAL for one year	11,662,145	10,744,747
3.	Expected UAAL as of December 31 (1 + 2)	178,264,211	164,241,135
4.	Change in Unfunded Liability due to:		
	a. Benefit Changes *	(2,577,185)	0
	b. Provision or Assumption Changes**	(23,054,547)	0
5.	Expected UAAL as of December 31 after changes in assumption, methods and plan provisions	152,632,479	164,241,135
6.	Actual UAAL as of December 31	142,208,540	166,602,066
7.	Actuarial gain/(loss) for the period (5 - 6)	10,423,939	(2,360,931)
	SOURCE OF GAINS/(LOSSES)		
8.	Asset gain/(loss) (See Table 9)	8,139,885	2,553,581
9.	Salary liability gain/(loss) for the period	(1,520,469)	(4,385,814)
10.	Benefit adjustment granted as of October 1 (0.00% in 2020, 0.00% in 2019)	0	0
11.	Net liability gain/(loss) for the period (7- 8 - 9 - 10)	3,804,523	(528,698)

* Change in the Unfunded Liability due to Benefit Changes reflects a rule change regarding the maximum offset for money purchase balances.
** Change in the Unfunded Liability due to Provision or Assumption Changes reflects the change in member contribution rate from 2.8% to 3.0%.

Table 4 - Summary of Historical Valuation Results

As of the Valuation Date January 1,

	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012
1. Number of members										
a. Active	13,402	13,283	12,747	12,214	11,975	11,681	11,391	11,341	11,076	10,958
b. Disabled	1,195	1,149	1,106	1,058	991	944	904	851	814	774
c. Survivor	134	135	132	127	120	119	116	117	114	107
d. Total	14,731	14,567	13,985	13,399	13,086	12,744	12,411	12,309	12,004	11,839
2. Covered payroll (prior year)	$ 1,168,873	$ 1,112,893	$ 1,012,667	$ 947,520	$ 917,100	$ 863,106	$ 827,633	$ 810,578	$ 787,010	$ 755,952
3. Average compensation	$ 87,216	$ 83,783	$ 79,444	$ 77,577	$ 76,585	$ 73,890	$ 72,657	$ 71,473	$ 71,055	$ 68,986
4. Covered payroll for upcoming year	$ 1,175,753	$ 1,143,563	$ 1,043,407	$ 976,603	$ 942,822	$ 886,802	$ 844,536	$ 834,268	$ 833,177	$ 801,017
5. Actuarial value of assets	$ 463,247	$ 432,227	$ 409,327	$ 395,302	$ 374,944	$ 361,070	$ 345,009	$ 325,181	$ 305,455	$ 290,988
6. Market value of assets	$ 493,253	$ 442,442	$ 394,247	$ 403,693	$ 360,747	$ 351,520	$ 353,776	$ 339,347	$ 301,653	$ 275,873
7. Present value of benefits										
a. Actives	$ 495,083	$ 471,471	$ 424,784	$ 246,318	$ 238,978	$ 225,012	$ 201,711	$ 203,254	$ 198,232	$ 192,101
b. Disabled	396,025	371,814	350,578	315,103	287,456	265,786	243,179	221,357	204,847	189,203
c. Survivors	38,263	36,555	34,594	31,490	30,923	30,430	25,703	26,290	25,700	23,036
d. Total	$ 929,372	$ 879,840	$ 809,956	$ 592,911	$ 557,357	$ 521,228	$ 470,593	$ 450,900	$ 428,778	$ 404,340
8. Calculated Contribution	4.23%	4.34%	4.40%	2.69%	2.48%	2.37%	1.89%	1.97%	2.05%	1.98%

$ amounts in '000s

Table 5 - Allocation of Plan Assets at Fair Value

	Actual Allocation January 1, 2021	Target Allocation
1. Global Equity	39.4%	39.0%
2. Equity Long/Short	8.0%	8.0%
3. Private Markets	24.0%	26.0%
4. Fixed Income	13.1%	15.0%
5. Absolute Return	9.9%	10.0%
6. Cash	5.6%	2.0%
	100.0%	100.0%

Asset Allocation as of January 1, 2021

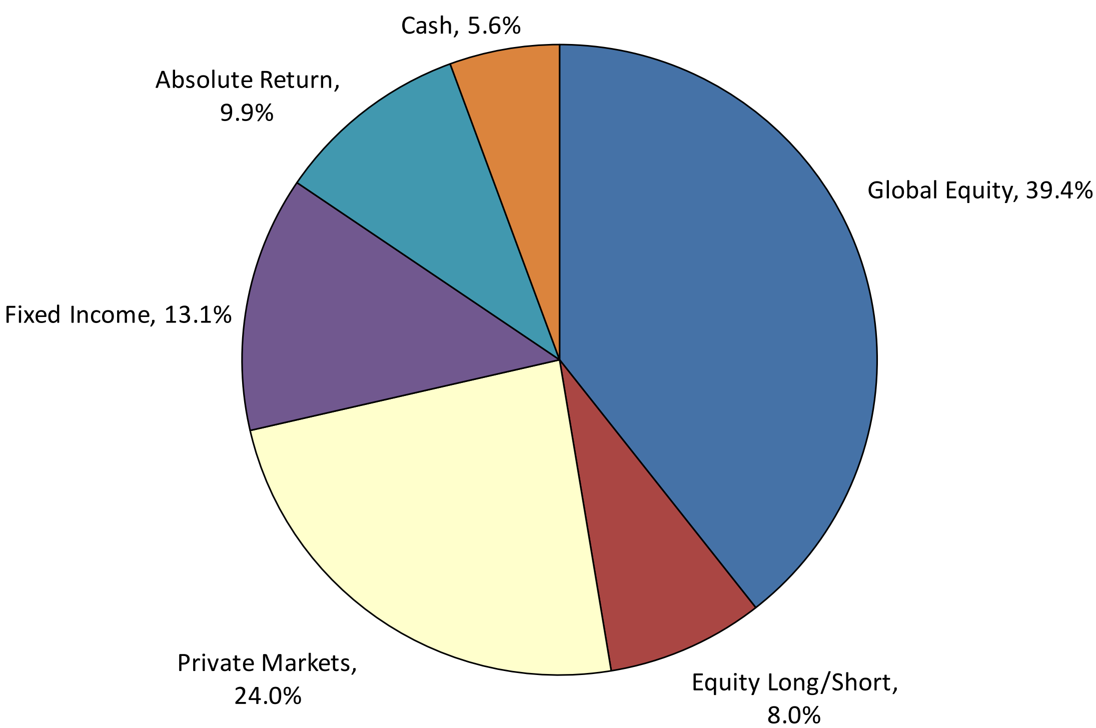


Table 6 - Reconciliation of Plan Net Assets

			Year Ending	
			December 31, 2020	December 31, 2019
1.	Market value of assets at January 1		$ 442,441,653	$ 394,246,510
2.	Revenue for the year			
	a.	Contributions		
		i. Member contributions	$ 4,463,916	$ 4,249,903
		ii. Employer contributions *	24,566,291	21,899,808
		iii. Contributions from the SWDD Plan	0	0
	b.	Net investment income		
		i. Interest	$ 1,452,471	$ 1,999,949
		ii. Dividends	2,243,927	2,617,900
		iii. Net change in accrued income	(141,444)	90,788
		iv. Unrealized gain/(loss)	37,139,707	17,811,720
		v. Realized gain/(loss)	19,003,922	35,580,870
		vi. Investment expense	(3,499,225)	(3,511,067)
		vii. Other Income	1,738,630	1,630,160
	c.	Total revenue	$ 86,968,195	$ 82,370,031
3.	Expenditures for the year			
	a.	Benefit payments and refunds	$ (34,184,523)	$ (32,232,860)
	b.	Administrative expense	(1,972,683)	(1,942,028)
	c.	Total expenditures	$ (36,157,206)	$ (34,174,888)
4.	Increase in net assets (Item 2c + Item 3c)		$ 50,810,989	$ 48,195,143
5.	Market value of assets at December 31 (Item 1 + Item 4)		$ 493,252,642	$ 442,441,653

*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	$	432,227,330
2.	Net new investments		
	a. Contributions	$	29,030,207
	b. Benefit payments		(34,184,523)
	c. Administrative expenses		(1,972,683)
	d. Net cash flow	$	(7,126,999)
3.	Assumed investment return rate for fiscal year		7.0%
4.	Assumed investment return for fiscal year	$	30,006,468
5.	Expected Actuarial Value at end of year	$	455,106,799
6.	Market value of assets at end of year	$	493,252,642
7.	Excess return (6-5)	$	38,145,843
8.	Development of amounts to be recognized as of December 31, 2020:		

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)
2016	$ 0	$ 0	$ 0	1	$ 0	$ 0
2017	0	0	0	2	0	0
2018	0	0	0	3	0	0
2019	10,214,323	0	10,214,323	4	2,553,581	7,660,742
2020	27,931,520	0	27,931,520	5	5,586,304	22,345,216
Total	$ 38,145,843	$ 0	$ 38,145,843		$ 8,139,885	$ 30,005,958

9.	Actuarial value of assets as of December 31, 2020 (Item 6 - Item 8)	$	463,246,684
10.	Ratio of actuarial value to market value		93.9%

Amounts in column (1) for fiscal years ending 2016 through 2019 are from the prior valuation. The column (1) amount for fiscal year 2020 is developed using item 7 less the total of column (1) for fiscal years ending 2016 through 2019. To the extent possible, the 2020 excess or shortfall is used to reduce prior bases. In this case, both the 2019 base and 2020 base were excess bases and no offsetting occurred. The fiscal year 2016 through 2018 bases are $0 because they were previously offset.

Table 8 - Investment Yields

Item	Market Value	Actuarial Value
1. Assets as of January 1, 2020 (A)	$ 442,441,653	$ 432,227,330
2. Contributions during FY20	29,030,207	29,030,207
3. Benefit payments and administrative expenses during FY20	(36,157,206)	(36,157,206)
4. Investment return during FY20	57,937,988	38,146,353
5. Assets as of January 1, 2021 (B): (1 + 2 + 3 + 4)	$ 493,252,642	$ 463,246,684
6. Approximate rate of return on average invested assets		
a. Net investment income (I)	$ 57,937,988	$ 38,146,353
b. Estimated return based on (2I / (A + B - I))	13.20%	8.90%

Table 9 - Gain/(Loss) on Actuarial Value of Assets

Item	Valuation as of January 1, 2021	Valuation as of January 1, 2020
1. Actuarial assets, prior valuation	$ 432,227,330	$ 409,326,924
2. Total contributions since prior valuation	$ 29,030,207	$ 26,149,710
3. Benefit payments and administrative expenses since prior valuation	$ (36,157,206)	$ (34,174,888)
4. Assumed net investment income at actuarial rate%		
a. Beginning assets	$ 30,255,913	$ 28,652,884
b. Contributions	1,016,057	915,240
c. Benefit payments and administrative expenses	(1,265,502)	(1,196,121)
d. Total	$ 30,006,468	$ 28,372,003
5. Expected actuarial assets (1 + 2 + 3 + 4d)	$ 455,106,799	$ 429,673,749
6. Actual actuarial assets, this valuation	$ 463,246,684	$ 432,227,330
7. Asset gain/(loss) since prior valuation (6 - 5)	$ 8,139,885 Gain	$ 2,553,581 Gain

Table 10 - History of Investment Return Rates

For Fiscal Year Ending	Market Value	Actuarial Value
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%
December 31, 2020	13.20%	8.90%
Average Returns		
Last 5 Years	9.34%	7.39%
Last 10 Years	8.07%	7.32%

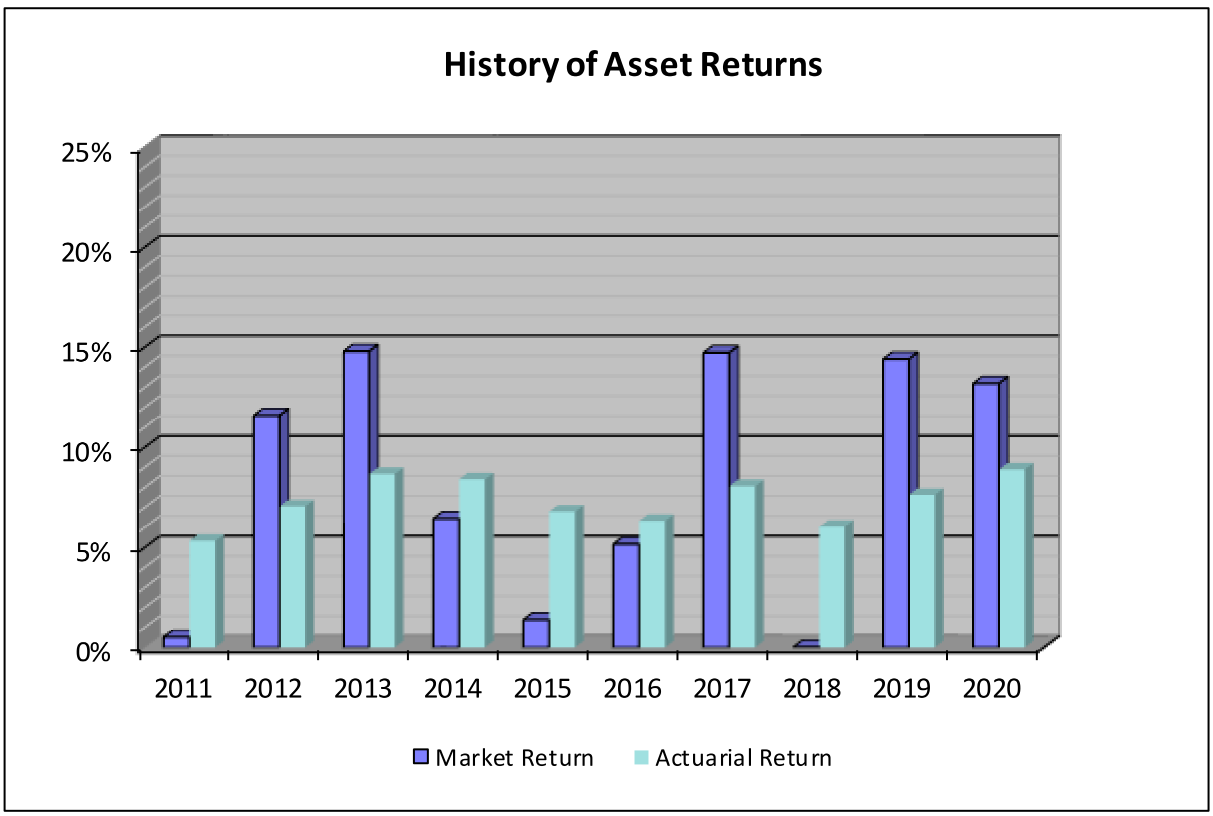


Table 11a - Schedule of Funding Progress

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, 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%
January 1, 2021	463,246,684	605,455,223	142,208,539	76.5%	1,168,873,123	12.2%

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, 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%
January 1, 2021	463,246,684	540,390,293	77,143,609	85.7%	1,168,873,123	6.6%

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 12 - Solvency Test

	Aggregated Accrued Liabilities for				Portion of Accrued Liabilities Covered by Reported Assets		
Valuation Date	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, 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%
January 1, 2021	0	434,288	171,167	463,247	100%	100%	17%

$ amounts in ‘000s

Table 13 - Cash Flow Analysis

Year Ending December 31,	Contributions for the Year	Expenditures During the Year: Benefit Payments	Refund of Contributions	Expenses	Total	External Cash Flow for the Year	Market Value of Assets	External Cash Flow as Percent of Market Value
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	29,030	(34,185)	0	(5,472)	(39,656)	(10,626)	493,253	(2.2%)
2021*	32,095	(36,721)	0	(5,663)	(42,385)	(10,290)	519,571	(2.0%)
2022*	35,800	(40,031)	0	(5,862)	(45,892)	(10,092)	548,068	(1.8%)
2023*	37,173	(43,346)	0	(6,067)	(49,412)	(12,240)	576,475	(2.1%)

Results for 2021, 2022, & 2023 are based on expected contributions, expected benefit payments, and assumed investment return of 7.0%
Expected contributions are based on applicable employee rate of 3.0% 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

	January 1, 2021	January 1, 2020	January 1, 2019
1. Active members			
a. Number	13,402	13,283	12,747
b. Total payroll	$ 1,168,873,123	$ 1,112,892,992	$ 1,012,666,543
c. Average annual salary	$ 87,216	$ 83,783	$ 79,444
d. Average age	40.8	40.9	41.1
e. Average service	10.2	10.4	10.6
2. Disabled members and beneficiaries			
a. Number	1,195	1,149	1,106
b. Total annual benefits	$ 31,610,223	$ 29,576,339	$ 27,860,403
c. Average annual benefit	$ 26,452	$ 25,741	$ 25,190
d. Average age	59.2	58.8	58.5
3. Survivors of deceased active members			
a. Number	134	135	132
b. Total annual benefits	$ 3,498,584	$ 3,409,409	$ 3,226,681
c. Average annual benefit	$ 26,109	$ 25,255	$ 24,445
d. Average age	55.8	54.2	53.7

Table 15 - Historical Summary of Active Member Data

Valuation Date	Active Count	Average Age	Average Service	Covered Payroll	Average Annual Salary	Percent Change in Average Salary
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%
January 1, 2021	13,402	40.8	10.2	1,168,873,123	87,216	4.10%

Table 16 - Distribution of Active Members by Age and by Years of Service

As of December 31, 2020

	Years of Credited Service												
Attained Age	Less than 1 Count & Avg. Comp.	1-2 Count & Avg. Comp.	2-3 Count & Avg. Comp.	3-4 Count & Avg. Comp.	4-5 Count & Avg. Comp.	5-9 Count & Avg. Comp.	10-14 Count & Avg. Comp.	15-19 Count & Avg. Comp.	20-24 Count & Avg. Comp.	25-29 Count & Avg. Comp.	30-34 Count & Avg. Comp.	35 & Over Count & Avg. Comp.	Total Count & Avg. Comp.
Under 25	204	107	34	3	3								352
	$54,362	$59,718	$66,650	$64,405	$62,723								$57,334
25-29	375	398	325	244	158	130							1,630
	$57,924	$62,595	$68,000	$74,491	$82,292	$83,076							$67,921
30-34	342	400	297	289	275	611	36						2,250
	$61,732	$66,793	$68,685	$76,899	$83,779	$87,163	$87,587						$75,512
35-39	187	195	180	173	205	739	457	106					2,242
	$62,763	$68,840	$70,809	$78,481	$84,920	$89,543	$94,804	$102,954					$84,435
40-44	111	99	85	92	69	421	488	501	99				1,965
	$64,608	$69,276	$70,639	$76,329	$83,045	$90,240	$96,206	$102,909	$112,053				$91,795
45-49	62	66	43	39	55	217	284	567	505	54			1,892
	$67,698	$72,281	$75,584	$87,271	$83,013	$86,567	$95,407	$99,901	$106,160	$117,439			$96,546
50-54	44	38	34	15	31	153	177	418	554	295	42		1,801
	$72,407	$77,771	$83,211	$103,136	$86,792	$92,393	$94,545	$100,037	$106,304	$114,663	$116,890		$101,900
55-59	39	24	11	10	7	60	71	126	204	180	97	15	844
	$93,767	$103,793	$95,042	$93,158	$88,258	$90,720	$94,490	$101,001	$103,172	$109,279	$119,074	$151,561	$104,457
60-64	18	7	10	7	5	21	26	44	55	36	52	43	324
	$78,762	$79,489	$87,788	$94,364	$69,787	$107,139	$101,093	$95,918	$102,619	$110,596	$116,193	$109,758	$102,924
65 & Over	3	1	3	2	1	13	8	15	14	6	11	25	102
	$60,904	$60,000	$111,288	$80,226	$86,400	$96,095	$93,313	$92,088	$106,886	$102,342	$134,810	$116,780	$105,033
Total	1,385	1,336	1,022	874	809	2,365	1,547	1,777	1,431	571	202	83	13,402
	$61,713	$66,751	$70,305	$77,683	$83,656	$88,830	$95,243	$100,876	$106,069	$112,842	$118,735	$119,428	$87,216

Average:	Age:	40.8	Number of participants:	Males:	11,925
	Service:	10.2		Females:	1,477

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

	Added to Rolls*		Removed from Rolls		Rolls-End of Year			
Year Ended	Number	Annual Benefit	Number	Annual Benefit	Number	Annual Benefit	% Increase in Annual Benefit	Average Annual Benefit
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
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
December 31, 2020	67	2,644,753	22	521,694	1,329	35,108,807	6.44%	26,417

*Includes benefit adjustments

Table 18 - Summary of Members and Adjusted Payroll by Employer

City Code	City Name	Police No.	Police Earnings	Fire No.	Fire Earnings	Total No.	Total Earnings
550	ADAMS COUNTY FPD	0	$ 0	106	$ 10,155,509	106	$ 10,155,509
3	ALAMOSA	22	1,350,980	0	0	22	1,350,980
4	ALMA	1	49,766	0	0	1	49,766
5	ANTONITO	2	74,255	0	0	2	74,255
7	ARVADA	185	16,975,154	0	0	185	16,975,154
501	ARVADA FPD	0	0	167	16,348,672	167	16,348,672
8	ASPEN	24	1,949,053	0	0	24	1,949,053
711	ASPEN FPD	0	0	11	1,054,815	11	1,054,815
9	AULT	5	264,794	0	0	5	264,794
712	AULT FPD	0	0	7	285,376	7	285,376
10	AURORA	757	69,399,333	416	34,011,849	1,173	103,411,182
11	AVON	20	1,679,197	0	0	20	1,679,197
12	BASALT	11	900,293	0	0	11	900,293
13	BAYFIELD	9	510,158	0	0	9	510,158
718	BENNETT FPD #7	0	0	25	1,513,421	25	1,513,421
503	BERTHOUD FPD	0	0	30	2,229,049	30	2,229,049
5030	BERTHOUD FPD	0	0	2	275,601	2	275,601
538	BEULAH FIRE PROTECTION & AMBULANCE DISTRICT	0	0	2	93,250	2	93,250
7331	BIG SANDY FPD	0	0	1	39,999	1	39,999
580	BLACK FOREST FIRE RESCUE	0	0	20	1,372,250	20	1,372,250
723	BLACK HAWK	0	0	20	1,770,875	20	1,770,875
18	BLANCA	1	41,285	0	0	1	41,285
22	BOULDER	183	16,815,919	111	11,052,566	294	27,868,485
726	BOULDER MOUNTAIN FPD	0	0	5	292,365	5	292,365
730	BOULDER RURAL FPD	0	0	22	1,951,845	22	1,951,845
7700	BRIGGSDALE FPD	0	0	1	54,000	1	54,000
3260	BRIGHTON	1	138,647	0	0	1	138,647
326	BRIGHTON	76	6,466,378	0	0	76	6,466,378
26	BRIGHTON (GREATER) FPD	0	0	74	6,718,610	74	6,718,610
504	BROADMOOR FPD	0	0	4	328,954	4	328,954

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

City Code	City Name	Police No.	Police Earnings	Fire No.	Fire Earnings	Total No.	Total Earnings
27	BROOMFIELD	175	$ 15,833,674	0	$ 0	175	$ 15,833,674
28	BRUSH	11	570,615	0	0	11	570,615
29	BUENA VISTA	10	534,682	4	159,326	14	694,008
735	BYERS FPD #9	0	0	2	83,404	2	83,404
736	CALHAN FPD	0	0	2	69,615	2	69,615
33	CANON CITY	37	2,071,788	0	0	37	2,071,788
533	CANON CITY AREA FPD	0	0	32	2,469,856	32	2,469,856
740	CARBONDALE & RURAL FPD	0	0	21	1,730,429	21	1,730,429
35	CASTLE ROCK	0	0	92	8,322,827	92	8,322,827
37	CENTER	7	286,471	0	0	7	286,471
38	CENTRAL CITY	0	0	1	93,915	1	93,915
749	CHAFFEE COUNTY FPD	0	0	6	336,660	6	336,660
40	CHERRY HILLS VILLAGE	23	2,275,156	0	0	23	2,275,156
754	CIMARRON HILLS FPD	0	0	22	1,466,591	22	1,466,591
7125	CLEAR CREEK FIRE AUTHORITY	0	0	7	480,401	7	480,401
509	CLIFTON FPD	0	0	20	1,337,395	20	1,337,395
757	COAL CREEK CANYON FPD	0	0	1	69,927	1	69,927
44	COLLBRAN MARSHALS	2	102,294	0	0	2	102,294
531	COLORADO RIVER FPD	0	0	49	3,274,551	49	3,274,551
45	COLORADO SPRINGS	706	60,338,219	419	39,207,393	1,125	99,545,612
46	COLUMBINE VALLEY	6	406,019	0	0	6	406,019
47	COMMERCE CITY	101	9,360,624	0	0	101	9,360,624
48	CORTEZ	29	1,571,473	0	0	29	1,571,473
765	CORTEZ FPD	0	0	14	660,585	14	660,585
772	CRESTED BUTTE FPD	0	0	18	1,278,777	18	1,278,777
774	CRIPPLE CREEK	0	0	12	705,468	12	705,468
57	DACONO	13	1,140,463	0	0	13	1,140,463
58	DEBEQUE	5	297,369	0	0	5	297,369
779	DEBEQUE FPD	0	0	7	537,295	7	537,295
60	DEL NORTE	4	168,997	0	0	4	168,997

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

City Code	City Name	Police No.	Police Earnings	Fire No.	Fire Earnings	Total No.	Total Earnings
61	DELTA	23	$ 1,508,256	0	$ 0	23	$ 1,508,256
783	DELTA COUNTY FPD #1	0	0	3	119,520	3	119,520
62	DENVER	1,449	142,089,079	972	95,493,703	2,421	237,582,782
63	DILLON	9	656,403	0	0	9	656,403
64	DINOSAUR	3	167,400	0	0	3	167,400
566	DONALD WESCOTT FPD	0	0	21	1,564,669	21	1,564,669
67	DURANGO	55	3,906,799	0	0	55	3,906,799
567	DURANGO FPD	0	0	82	5,964,968	82	5,964,968
522	EAGLE RIVER FPD	0	0	67	5,345,068	67	5,345,068
507	EAST GRAND FPD #4	0	0	5	328,565	5	328,565
795	EATON FPD	0	0	18	1,049,386	18	1,049,386
73	EDGEWATER	17	1,290,715	0	0	17	1,290,715
74	ELIZABETH	8	442,112	0	0	8	442,112
515	ELIZABETH FPD	0	0	20	871,040	20	871,040
7102	ELK CREEK FPD	0	0	16	963,594	16	963,594
75	EMPIRE	2	96,523	0	0	2	96,523
76	ENGLEWOOD	73	6,766,755	0	0	73	6,766,755
77	ERIE	41	3,216,687	0	0	41	3,216,687
523	ESTES VALLEY FPD	0	0	4	344,232	4	344,232
79	EVANS	35	2,824,339	0	0	35	2,824,339
579	EVANS FPD	0	0	19	1,282,633	19	1,282,633
7109	EVERGREEN FPD	0	0	7	527,385	7	527,385
510	FAIRMOUNT FPD	0	0	28	2,049,541	28	2,049,541
80	FAIRPLAY MARSHALLS	4	189,179	0	0	4	189,179
7112	FALCON FPD	0	0	49	3,131,410	49	3,131,410
81	FEDERAL HEIGHTS	20	1,509,018	14	863,003	34	2,372,021
810	FEDERAL HEIGHTS FIRE	0	0	1	115,481	1	115,481
82	FIRESTONE	30	2,543,288	0	0	30	2,543,288
85	FLORENCE	11	527,205	0	0	11	527,205
7222	FOOTHILLS FIRE & RESCUE	0	0	4	316,000	4	316,000

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

City Code	City Name	Police No.	Police Earnings	Fire No.	Fire Earnings	Total No.	Total Earnings
86	FORT COLLINS	254	$ 24,409,988	0	$ 0	254	$ 24,409,988
7122	FORT LEWIS MESA FPD	0	0	2	129,333	2	129,333
87	FORT LUPTON	21	1,578,168	0	0	21	1,578,168
7123	FORT LUPTON FPD	0	0	33	2,338,687	33	2,338,687
88	FORT MORGAN	28	1,801,542	0	0	28	1,801,542
89	FOUNTAIN	54	3,794,985	33	2,290,622	87	6,085,607
90	FOWLER POLICE	4	144,304	0	0	4	144,304
511	FRANKTOWN FPD	0	0	22	1,471,727	22	1,471,727
592	FREDERICK FIRESTONE FPD	0	0	52	4,034,024	52	4,034,024
5920	FREDERICK FIRESTONE FPD	0	0	6	668,443	6	668,443
93	FRISCO	11	752,123	0	0	11	752,123
7131	FRONT RANGE FIRE RESCUE FPD	0	0	32	2,575,705	32	2,575,705
94	FRUITA	17	1,033,573	0	0	17	1,033,573
7132	GALETON FPD	0	0	3	211,741	3	211,741
95	GARDEN CITY	4	237,540	0	0	4	237,540
7135	GATEWAY-UNAWEEP FPD	0	0	7	237,077	7	237,077
7136	GENESEE FPD	0	0	3	234,976	3	234,976
97	GEORGETOWN	3	202,641	0	0	3	202,641
99	GLENDALE	27	2,249,995	0	0	27	2,249,995
100	GLENWOOD SPRINGS	24	1,798,091	26	1,885,394	50	3,683,485
101	GOLDEN	53	4,704,868	13	1,006,715	66	5,711,583
102	GRANADA	1	39,096	0	0	1	39,096
7147	GRAND FPD #1	0	0	4	243,011	4	243,011
104	GRAND JUNCTION	125	9,563,961	134	10,183,625	259	19,747,586
7149	GRAND LAKE FPD	0	0	13	834,198	13	834,198
7150	GRAND VALLEY FPD	0	0	23	1,626,311	23	1,626,311
7153	GREATER EAGLE FPD	0	0	16	1,060,452	16	1,060,452
107	GREELEY	154	14,446,210	120	10,319,539	274	24,765,749
512	GREEN MOUNTAIN FALLS-CHIPITA PARK FPD	0	0	1	56,392	1	56,392
109	GREENWOOD VILLAGE	61	5,414,744	0	0	61	5,414,744

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

City		Police		Fire		Total	
Code	City Name	No.	Earnings	No.	Earnings	No.	Earnings
7156	GYPSUM FPD	0	$ 0	8	$ 525,565	8	$ 525,565
7158	HARTSEL FPD	0	0	1	75,675	1	75,675
115	HAXTUN	2	106,230	0	0	2	106,230
119	HOLYOKE	4	208,119	0	0	4	208,119
7176	HUDSON FPD	0	0	28	2,037,648	28	2,037,648
124	HUGO	2	92,110	0	0	2	92,110
125	IDAHO SPRINGS	9	533,519	0	0	9	533,519
126	IGNACIO	8	549,679	0	0	8	549,679
7187	INTER-CANYON FPD	0	0	4	269,166	4	269,166
7191	JEFFERSON-COMO FPD	0	0	8	477,237	8	477,237
129	JOHNSTOWN	24	1,768,537	0	0	24	1,768,537
132	KERSEY	3	203,008	0	0	3	203,008
7198	KIOWA FPD	0	0	3	174,136	3	174,136
5136	KREMMLING FPD	0	0	2	121,344	2	121,344
138	LA JARA	3	171,855	0	0	3	171,855
139	LA JUNTA	10	489,253	13	586,571	23	1,075,824
144	LA SALLE	7	367,521	0	0	7	367,521
7211	LA SALLE FPD	0	0	11	775,812	11	775,812
146	LA VETA	1	45,075	0	0	1	45,075
137	LAFAYETTE	38	3,465,336	31	2,639,341	69	6,104,677
593	LAKE DILLON FPD	0	0	63	4,966,594	63	4,966,594
7206	LAKE GEORGE FPD	0	0	1	50,700	1	50,700
263	LAKESIDE	4	228,960	0	0	4	228,960
143	LAMAR	14	781,357	8	377,586	22	1,158,943
141	LARKSPUR FPD	0	0	19	1,265,723	19	1,265,723
147	LEADVILLE	7	358,121	12	703,669	19	1,061,790
574	LEFTHAND FPD	0	0	2	150,208	2	150,208
149	LITTLETON	75	7,330,571	0	0	75	7,330,571
150	LOCHBUIE	10	676,312	0	0	10	676,312
214	LOG LANE VILLAGE	2	86,499	0	0	2	86,499

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

City Code	City Name	Police No.	Police Earnings	Fire No.	Fire Earnings	Total No.	Total Earnings
268	LONE TREE	49	$ 4,425,183	0	$ 0	49	$ 4,425,183
151	LONGMONT	159	14,478,184	88	8,682,993	247	23,161,177
578	LOS PINOS FPD	0	0	23	1,308,373	23	1,308,373
153	LOVELAND	111	10,037,984	0	0	111	10,037,984
2153	LOVELAND FRA	0	0	94	9,378,921	94	9,378,921
7226	LOWER VALLEY FPD	0	0	17	1,100,551	17	1,100,551
7227	LYONS FPD	0	0	3	149,454	3	149,454
157	MANITOU SPRINGS	14	1,008,490	6	459,424	20	1,467,914
160	MEAD	11	801,886	0	0	11	801,886
163	MILLIKEN	11	745,651	0	0	11	745,651
166	MONTE VISTA	13	580,385	0	0	13	580,385
167	MONTROSE	41	2,535,076	0	0	41	2,535,076
537	MONTROSE FPD	0	0	37	2,738,731	37	2,738,731
168	MONUMENT	18	1,224,853	0	0	18	1,224,853
170	MOUNTAIN VIEW	10	638,259	0	0	10	638,259
516	MOUNTAIN VIEW FPD	0	0	140	13,046,768	140	13,046,768
266	MOUNTAIN VILLAGE	7	471,551	0	0	7	471,551
7246	NEDERLAND FPD	0	0	5	372,225	5	372,225
7251	NORTH FORK FPD	0	0	1	71,550	1	71,550
532	NORTH METRO FIRE RESCUE	0	0	132	12,288,083	132	12,288,083
7253	NORTH ROUTT FPD	0	0	2	137,782	2	137,782
7255	NORTHEAST TELLER COUNTY FPD	0	0	14	984,341	14	984,341
175	NORTHGLENN	68	5,441,390	0	0	68	5,441,390
7259	NORTH-WEST FPD	0	0	15	750,686	15	750,686
178	NUNN	3	157,100	0	0	3	157,100
179	OAK CREEK	2	114,850	0	0	2	114,850
7263	OAK CREEK FPD	0	0	8	398,339	8	398,339
1790	OAK CREEK POLICE	1	80,176	0	0	1	80,176
180	OLATHE	5	253,128	0	0	5	253,128
7264	OLATHE FPD	0	0	9	507,842	9	507,842

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

City Code	City Name	Police No.	Police Earnings	Fire No.	Fire Earnings	Total No.	Total Earnings
588	PAGOSA FPD	0	$ 0	16	$ 764,577	16	$ 764,577
188	PAGOSA SPRINGS	6	333,302	0	0	6	333,302
189	PALISADE	10	566,567	3	166,317	13	732,884
190	PALMER LAKE	2	127,343	4	222,085	6	349,428
192	PAONIA	6	250,949	0	0	6	250,949
106	PARACHUTE	5	279,683	0	0	5	279,683
191	PARKER	67	6,248,254	0	0	67	6,248,254
7281	PEYTON FPD	0	0	1	33,456	1	33,456
7481	PLATEAU VALLEY FPD	0	0	6	433,266	6	433,266
7285	PLATTE CANYON FPD	0	0	19	1,242,951	19	1,242,951
7286	PLATTE VALLEY FPD	0	0	18	1,334,567	18	1,334,567
7287	PLATTE VALLEY FPD	0	0	4	421,115	4	421,115
196	PLATTEVILLE	8	477,845	0	0	8	477,845
513	PLATTEVILLE/GILCREST FPD	0	0	31	2,353,654	31	2,353,654
7289	PLEASANT VIEW METRO FIRE DISTRICT	0	0	6	330,042	6	330,042
518	POUDRE FIRE AUTHORITY	0	0	188	19,355,754	188	19,355,754
199	PUEBLO	202	14,718,836	136	10,244,123	338	24,962,959
519	PUEBLO RURAL FPD	0	0	28	1,538,498	28	1,538,498
7294	PUEBLO WEST METRO FPD	0	0	24	1,571,783	24	1,571,783
201	RANGELY	6	356251	0	0	6	356,251
7298	RATTLESNAKE FPD	0	0	9	458,310	9	458,310
521	RED WHITE & BLUE FPD	0	0	52	4,744,375	52	4,744,375
206	RIFLE	19	1256344	0	0	19	1,256,344
551	ROARING FORK FRA	0	0	31	2,828,446	31	2,828,446
208	ROCKY FORD	5	202675	5	189,425	10	392,100
7314	RYE FPD	0	0	4	210,833	4	210,833
542	SABLE-ALTURA FPD	0	0	8	412,733	8	412,733
213	SALIDA	17	1114562	13	911,275	30	2,025,837
543	SECURITY FPD	0	0	43	2,096,735	43	2,096,735
219	SEVERANCE POLICE	7	461128	0	0	7	461,128

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

City Code	City Name	Police No.	Police Earnings	Fire No.	Fire Earnings	Total No.	Total Earnings
220	SHERIDAN	31	$ 2,614,283	0	$ 0	31	$ 2,614,283
222	SILT	7	358,256	0	0	7	358,256
228	SNOWMASS VILLAGE	9	755,201	0	0	9	755,201
525	SOUTH ADAMS COUNTY FPD	0	0	79	7,073,556	79	7,073,556
7339	SOUTH FORK	3	129,839	0	0	3	129,839
5339	SOUTH FORK FPD	0	0	6	274,573	6	274,573
540	SOUTH METRO FIRE RESCUE FPD	0	0	612	63,806,062	612	63,806,062
7340	SOUTHEAST WELD FPD	0	0	22	1,268,663	22	1,268,663
7341	SOUTHEAST WELD FPD	0	0	1	135,000	1	135,000
548	SOUTHERN PARK COUNTY FPD	0	0	1	48,000	1	48,000
229	SPRINGFIELD	2	87,226	0	0	2	87,226
231	STEAMBOAT SPRINGS	27	2,123,179	28	2,154,750	55	4,277,929
232	STERLING	22	1,204,087	22	1,117,325	44	2,321,412
7348	STRASBURG FPD #8	0	0	3	168,999	3	168,999
7349	STRATMOOR HILLS FPD	0	0	7	377,682	7	377,682
237	TELLURIDE	12	1,002,068	0	0	12	1,002,068
545	TELLURIDE FPD	0	0	11	885,099	11	885,099
238	THORNTON	0	0	134	13,068,899	134	13,068,899
338	THORNTON	227	20,047,114	0	0	227	20,047,114
7354	TIMBERLINE FPD	0	0	4	183,136	4	183,136
2557	TRI-LAKES MONUMENT FPD	0	0	49	4,309,787	49	4,309,787
2400	TRINIDAD	0	0	1	57,200	1	57,200
240	TRINIDAD	24	1,262,859	15	922,440	39	2,185,299
595	UPPER PINE RIVER FPD	0	0	34	1,929,406	34	1,929,406
242	VAIL	27	2,309,225	36	2,796,709	63	5,105,934
7369	WELLINGTON FPD	0	0	20	1,209,183	20	1,209,183
7370	WELLINGTON FPD	0	0	7	668,270	7	668,270
7373	WEST DOUGLAS COUNTY FPD	0	0	1	97,829	1	97,829
534	WEST METRO FPD	0	0	347	34,664,931	347	34,664,931
5340	WEST METRO FPD	0	0	21	2,734,261	21	2,734,261

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

City		Police		Fire		Total	
Code	City Name	No.	Earnings	No.	Earnings	No.	Earnings
7375	WEST ROUTT FPD	0	0	8	287,649	8	287,649
2520	WESTMINSTER	0	0	2	227,280	2	227,280
252	WESTMINSTER	0	0	129	11,874,570	129	11,874,570
253	WHEAT RIDGE	86	7,303,852	0	0	86	7,303,852
254	WIGGINS	3	168,984	0	0	3	168,984
7384	WINDSOR SEVERANCE FPD	0	0	52	3,919,870	52	3,919,870
259	WOODLAND PARK	20	1,213,827	0	0	20	1,213,827
260	WRAY	5	262,468	0	0	5	262,468
262	YUMA	9	431,987	0	0	9	431,987
	Totals	6,667	$ 579,603,045	6,735	$ 589,270,078	13,402	$ 1,168,873,123

Table 19 - Summary of Inactive Members

	Count	Average Age	Average Monthly Benefit
Totally Disabled Members*	167	59.4	$3,566
Occupationally Disabled Members*	1,028	59.2	$1,983
Beneficiaries of Deceased Active Members	134	55.8	$2,176

* 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 2021	Males	Females	Attained Age in 2021 (cont.)	Males	Females
(1)	(2)	(3)	(4)	(5)	(6)
50	3.94	2.65	70	16.83	12.74
55	5.65	3.73	75	26.88	20.93
60	7.93	5.58	80	45.39	35.81
65	11.35	8.24	85	79.53	64.00

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

	Year of Retirement			
Gender	2021	2026	2031	2036
Male	30.0	30.5	30.9	31.4
Female	32.4	32.9	33.3	33.8

b. Occupationally disabled retirees: Healthy retiree tables set forward three years.

	Annual Rate per 1,000 Members				
Attained Age in 2021	Males	Females	Attained Age in 2021 (cont.)	Males	Females
(1)	(2)	(3)	(4)	(5)	(6)
50	4.95	3.20	70	22.11	17.08
55	6.90	4.75	75	36.61	28.72
60	9.82	7.05	80	63.35	50.58
65	14.25	10.60	85	111.98	91.01

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 2021	Males	Females	Attained Age in 2021 (cont.)	Males	Females
(1)	(2)	(3)	(4)	(5)	(6)
50	30.00	20.00	70	40.50	27.93
55	30.00	20.00	75	54.39	41.02
60	30.00	20.00	80	77.76	62.74
65	32.66	21.36	85	116.27	95.64

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 2021	Males	Females	Attained Age in 2021 (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	0.63	0.48
30	0.40	0.26	50	0.97	0.68
35	0.44	0.31	55	1.52	1.01

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 23.

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. No future SRA contributions are assumed. 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. 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. Plan assets are included in the Fire & Police Members' Benefit Investment Fund Long-Term Pool.

Contributions to the Plan are used for the payment of death and disability benefits. 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 increased 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 one 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 one 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:

	2021	2020	2019
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	0.5
Ratio of actives to retirees and beneficiaries	10.1	10.3	10.3
Net cash flow as a percentage of market value of assets	-2.2%	-2.6%	-3.3%
Duration of the actuarial accrued liability	21.8	21.4	20.7

<u>RATIO OF MARKET VALUE OF ASSETS TO PAYROLL:</u>

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.

<u>RATIO OF ACTUARIAL ACCRUED LIABILITY TO PAYROLL:</u>

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.