

Fire and Police Pension Association Statewide Defined Benefit Plan

Actuarial Valuation Report
for the Year Beginning January 1, 2020





June 30, 2020

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

Re: Actuarial Valuation of the FPPA Statewide Defined Benefit Plan (the Plan) as of January 1, 2020

Dear Members of the Board:

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

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

Our Report presents the results of the January 1, 2020 actuarial valuation of the FPPA Statewide Defined Benefit Plan (SWDB). The Report describes the current actuarial condition of the SWDB, determines actuarially appropriate contribution rates, and analyzes changes in these required rates. The results presented herein may not be applicable for other purposes. In addition, the Report provides various summaries of the data.

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

House Bill 20-1044

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

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

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

Financing Objectives

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

Progress toward Realization of Financing Objectives

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

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

The UAAL/(surplus) and the funded ratio (ratio of the actuarial value of assets to the actuarial accrued liability) illustrate the progress toward the realization of certain financing objectives. Based on our actuarial valuation as of January 1, 2020, the Plan now has assets of \$71.4 million less than current liabilities assuming no allowance for future discretionary benefit adjustments. The prior year the plan had assets of \$37.6 million less than liabilities.

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



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

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

Benefit provisions

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

Assumptions and methods

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

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

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

Data

FPPA supplied data for retired, active and inactive members as of January 1, 2020. We did not audit this data, but we did apply a number of tests to the data, and we have concluded that the data is reasonable and consistent with the prior year's data. FPPA also supplied asset data as of January 1, 2020.



GASB Accounting

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

Projected Actuarial Results

The table on the following page shows the Funded Ratio (FR) and Actuarially Determined Contribution (ADC) projected over the next five years given alternative investment returns on the market value of assets. With the exception of the market value investment returns, the projections beyond 2020 are based on the same assumptions, methods and provisions used for the January 1, 2020 valuation. The projections assume the Board will grant benefit adjustments according to their current breakeven policy. For additional information see the “Discretionary Benefit Adjustments” portion of the Discussion Section.

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

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



Certification

All of our work conforms with generally accepted actuarial principles and practices, and to the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion, our calculations also comply with the requirements of Colorado state law and, where applicable, the Internal Revenue Code and ERISA.

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

Respectfully submitted,
Gabriel, Roeder, Smith & Company



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SECTION I

EXECUTIVE SUMMARY

Executive Summary

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

Note: Dollar amounts in \$000



Executive Summary

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



SECTION II

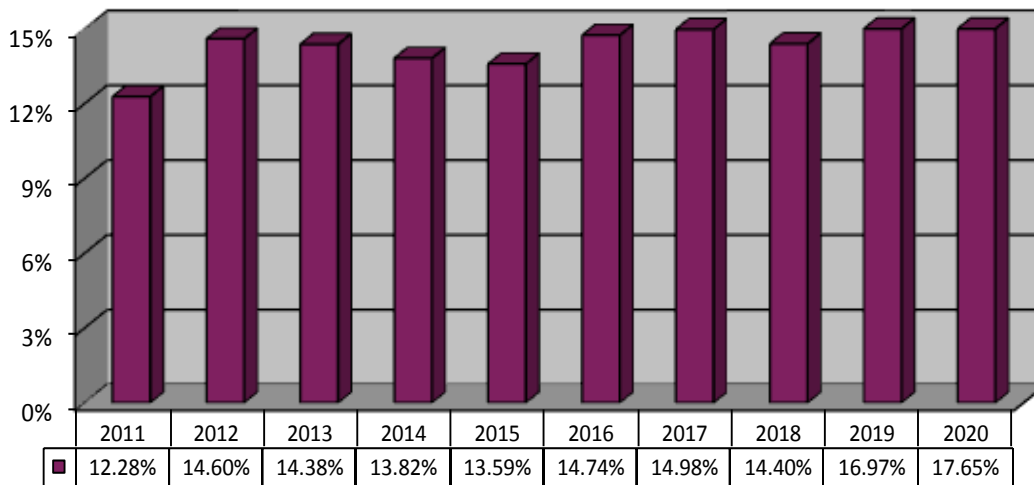
DISCUSSION

Contribution Requirements

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

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

**Actuarial Cost of Base Benefits as stated in the
Valuation as of January 1,**



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

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

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

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

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

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

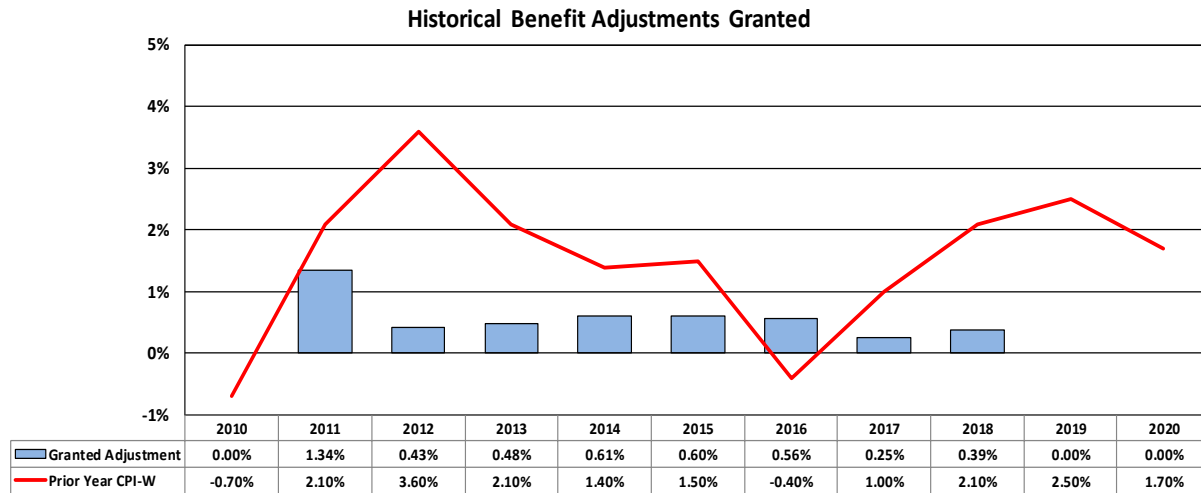
Starting in 2021, the Board will reduce the required additional contribution to 0.2%, for any employers that reentered the plan by January 1, 2021. This additional contribution will be assumed to cover the ongoing additional cost for this group. Employers reentering the plan thereafter will have additional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

Discretionary Benefit Adjustments

On October 1st of each year, annuitants may receive a benefit increase at the discretion of the Board of Directors. The increase can range from 0% to the higher of 3% or the change in CPI. Because the increases are purely discretionary, the valuation results in the report are shown assuming no further benefit adjustments are granted. Historically (until 2009), the Board granted benefit adjustments that reflected an increase similar to the change in CPI-W. In 2009, the Board began granting benefit adjustments based on an actuarial calculation which determined the permanent benefit adjustment supported by the total contribution rate. In 2015, the Board adopted a new formal policy summarized below which largely determines the permanent benefit adjustment which can be supported on an actuarial basis using only current surplus assets.

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

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



Stabilization Reserve Account (SRA)

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

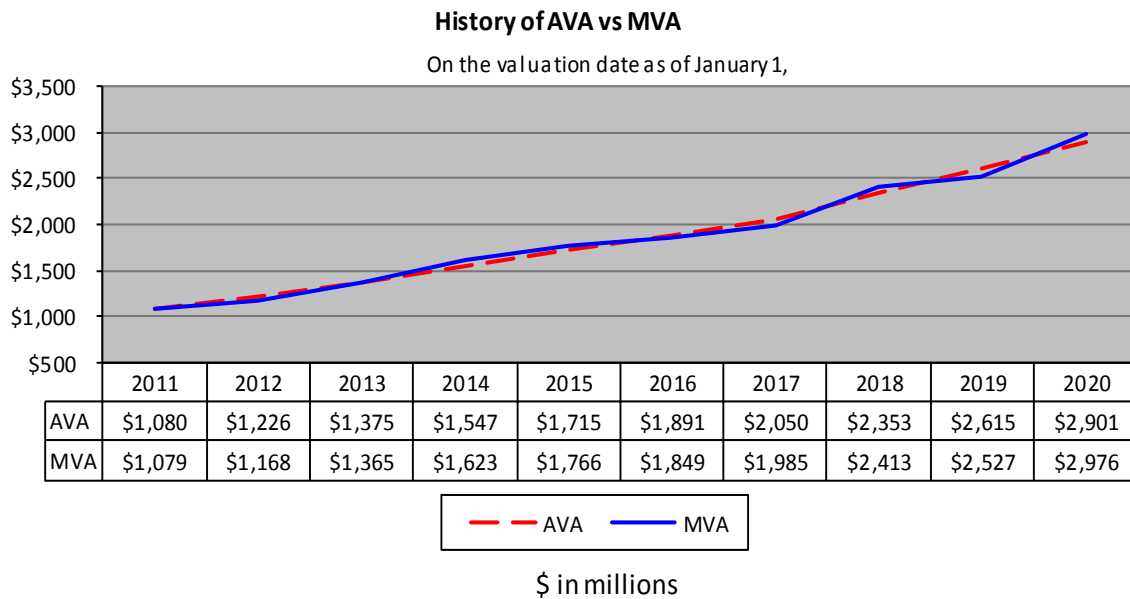
Financial Data and Experience

This section provides an analysis of the change in Plan Net Assets during the year and an estimate of the yield on mean assets of the SWDB. FPPA provided GRS with a summary of Plan assets as of January 1, 2020. The market value of assets (MVA) reported was \$2,975.90 million as of January 1, 2020, as compared to \$2,526.70 million as of January 1, 2019. Table 7 shows data from some of the tables included in the annual financial statements of the Plan. Table 9 shows the estimated yield on a market value basis and on the actuarial asset valuation method.

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

Table 8 shows the development of the actuarial value of assets. The actuarial value of assets increased from \$2,615.50 million to \$2,900.60 million since the prior valuation. This increase was less than expected and produced a loss of approximately \$18.83 million.

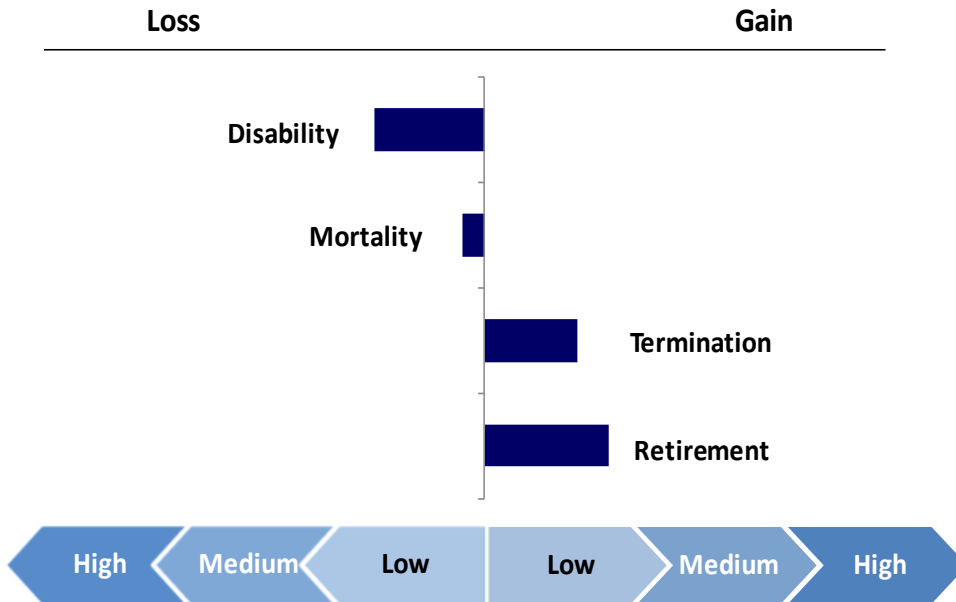
Effective January 1, 2012, the valuation assumed investment return was reduced from 8.0% to 7.5% per year. Effective January 1, 2019, the valuation assumed investment return was reduced from 7.5% to 7.0% per year. As indicated by item 8b of Table 9, the estimated return on mean market value was 14.4%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



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

Demographic Experience

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



Member Data

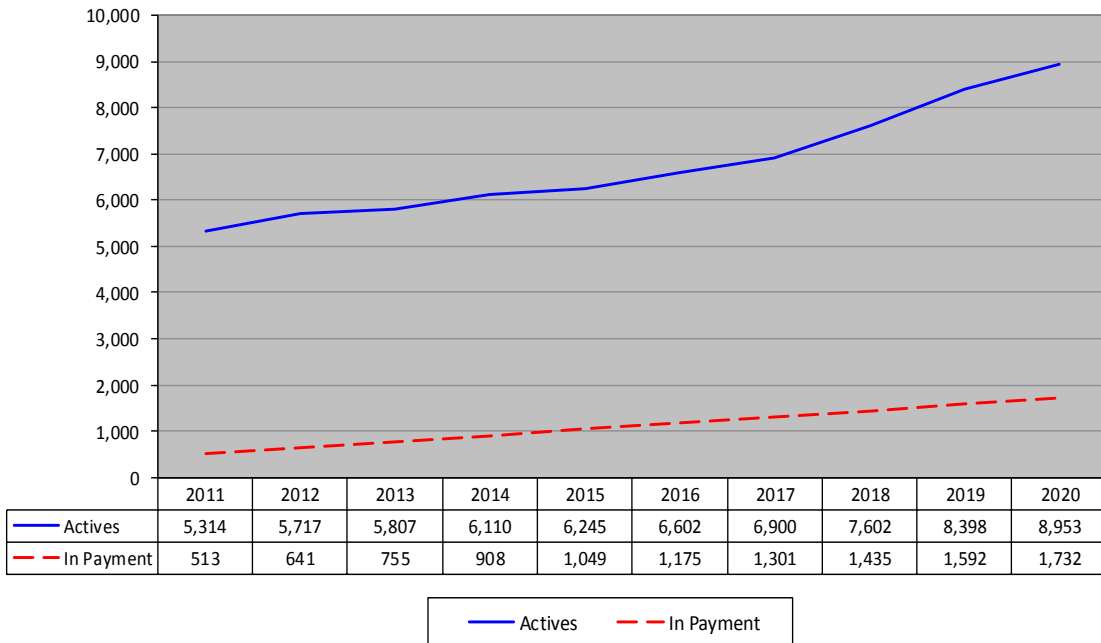
FPPA supplied member data as of January 1, 2020. While we did not audit this data, we did perform various tests to ensure that it was internally consistent, consistent with the prior year’s data, and was reasonable overall. Information provided for active members includes: name, member ID, sex, a code indicating whether the member was active or inactive, date of birth, service, salary, accumulated member contribution, and the accumulated stabilization reserve account. For retired members, data includes: name, member ID, sex, date of birth, date of retirement, amount of benefit, a code indicating the option elected and the type of retiree (normal retiree, vested retiree, beneficiary), and if applicable, the joint pensioner’s date of birth and sex.

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

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

History of Counts: Active vs In Payment

On the valuation date as of January 1,



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

Benefit Provisions

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

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

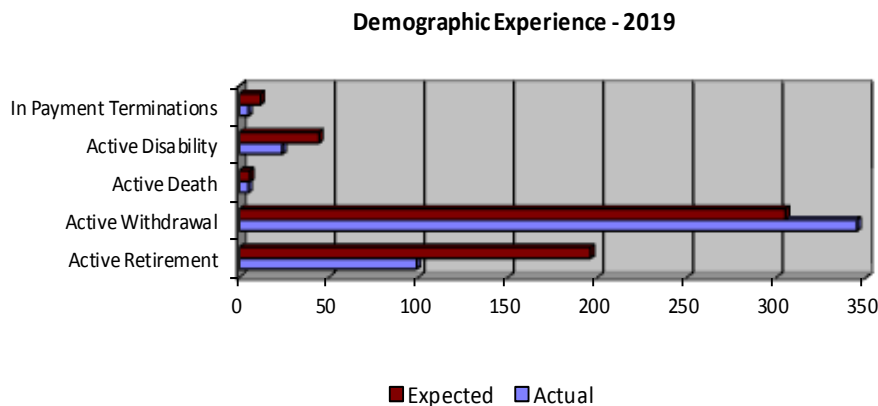
Actuarial Methods and Assumptions

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

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

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

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



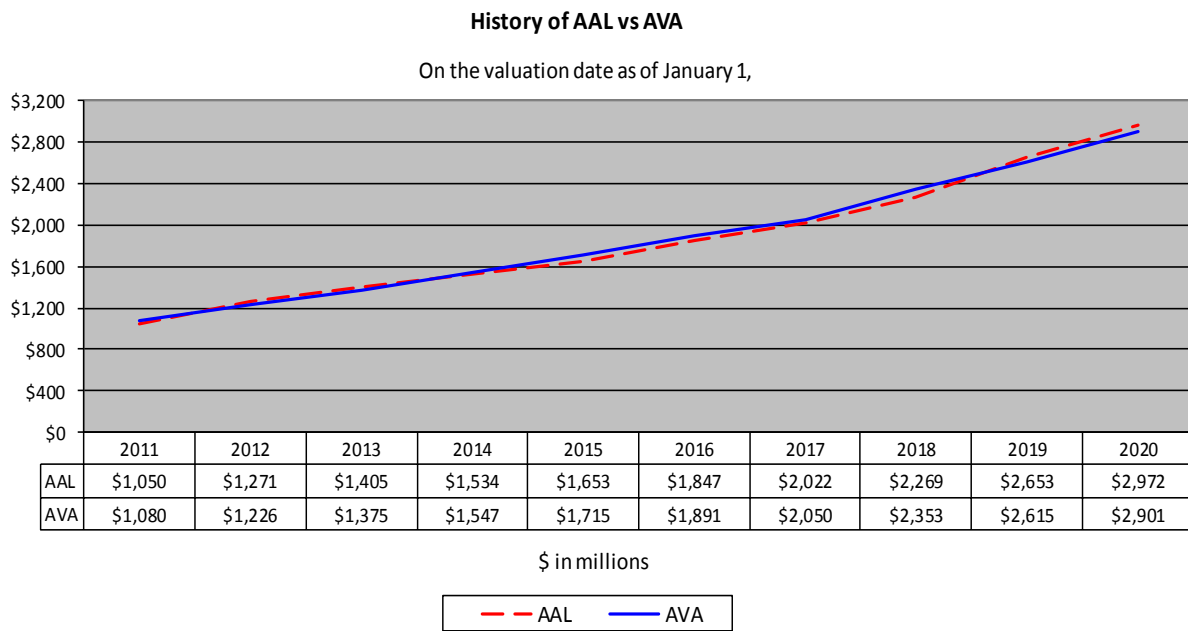
The In Payment Terminations above include deaths and benefits that were canceled for other reasons.

GASB and Funding Progress

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

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

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



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

Significant Factors Affecting Trends in Actuarial Information

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

Risk Metrics

The Statewide Defined Benefit Plan is a defined benefit plan for Colorado Fire and Police employees hired on or after April 8, 1978. In comparison to its public sector peers, the Statewide Defined Benefit could be considered a “young” plan as the Plan’s liabilities are still largely attributable to active members and are comparably small in relation to the active member payroll. Historically, in addition to new hires and wage inflation, the Statewide Defined Benefit payroll has grown through additional affiliations into the Plan (reentry groups). This potential pool of reentry members is diminishing, and it is unlikely that this will continue at the historical rate. Effective August 2, 2019, the Sheriff departments may affiliate with the SWDB and SWH Plan under the full benefit program. This may provide an additional source of new active members, although participation levels are not known at this time.

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

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

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

Additional risk metrics are shown in Appendix C.

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

Market Value Results

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

SECTION III

TABLES

Table 1 - Development of Contribution Rate

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

Table 2 - Actuarial Present Value of Future Benefits

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

Table 3 - Analysis of Normal Cost by Component

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

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

	January 1, 2020	January 1, 2019
1. Unfunded actuarial accrued liability (UAAL) as of January 1 of prior year	\$ 37,637,111	\$ (83,831,177)
1.b. Unfunded actuarial accrued liability (UAAL) as of January 1 of prior year after incorporation of the experience study recommendations	\$ 37,637,111	\$ 31,986,763
2. Total normal cost for year (Normal Cost % x actual payroll paid during year)	123,054,397	108,330,841
3. Non service purchase contributions during year ending December 31	(135,135,050)	(115,910,420)
4. Interest on UAAL for one year	2,634,598	2,239,073
5. Interest on Item 2 and Item 3 for one-half year	(415,672)	(260,798)
6. Expected UAAL as of January 1 (1 + 2 + 3 + 4 + 5)	\$ 27,775,384	\$ 26,385,459
7. Actual UAAL at end of year	\$ 71,387,140	\$ 37,637,111
8. Actuarial gain/(loss) for the period (6 - 7)	\$ (43,611,755)	\$ (11,251,652)
<u>SOURCE OF GAINS/(LOSSES)</u>		
9. Asset gain/(loss) (See Table 10)	\$ 18,826,035	\$ (22,197,585)
10. SRA liability gain/(loss) for the period (unsmoothed)	\$ (10,754,894)	\$ 9,560,020
11. Salary liability gain/(loss) for the period	\$ (8,579,325)	\$ (11,839,691)
12. Benefit Adjustment Granted as of October 1 (0.00% in 2019, 0.39% in 2018)	\$ 0	\$ (2,691,408)
13. Changes to benefit provisions (Rule of 80) from House Bill 20-1044	\$ (52,639,342)	N/A
14. Net liability gain/(loss) for the period (8 - 9 - 10 - 11 - 12 - 13)	\$ 9,535,771	\$ 15,917,012



Table 4b - Analysis of Change in Calculated Contribution Rate

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

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

Table 5 - Summary of Historical Valuation Results

As of the Valuation Date January 1,

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

\$ amounts in '000s



Table 6 - Allocation of Plan Assets at Fair Value

	<u>Actual Allocation at January 1, 2020</u>	<u>Target Allocation</u>
1. Global Equity	39.9%	38.0%
2. Equity Long/Short	8.1%	8.0%
3. Absolute Return	7.9%	8.0%
4. Illiquid Alternatives	24.7%	25.0%
5. Managed Futures	3.7%	4.0%
6. Fixed Income	14.9%	15.0%
7. Cash	<u>0.8%</u>	<u>2.0%</u>
	100.0%	100.0%

Asset Allocation as of January 1, 2020

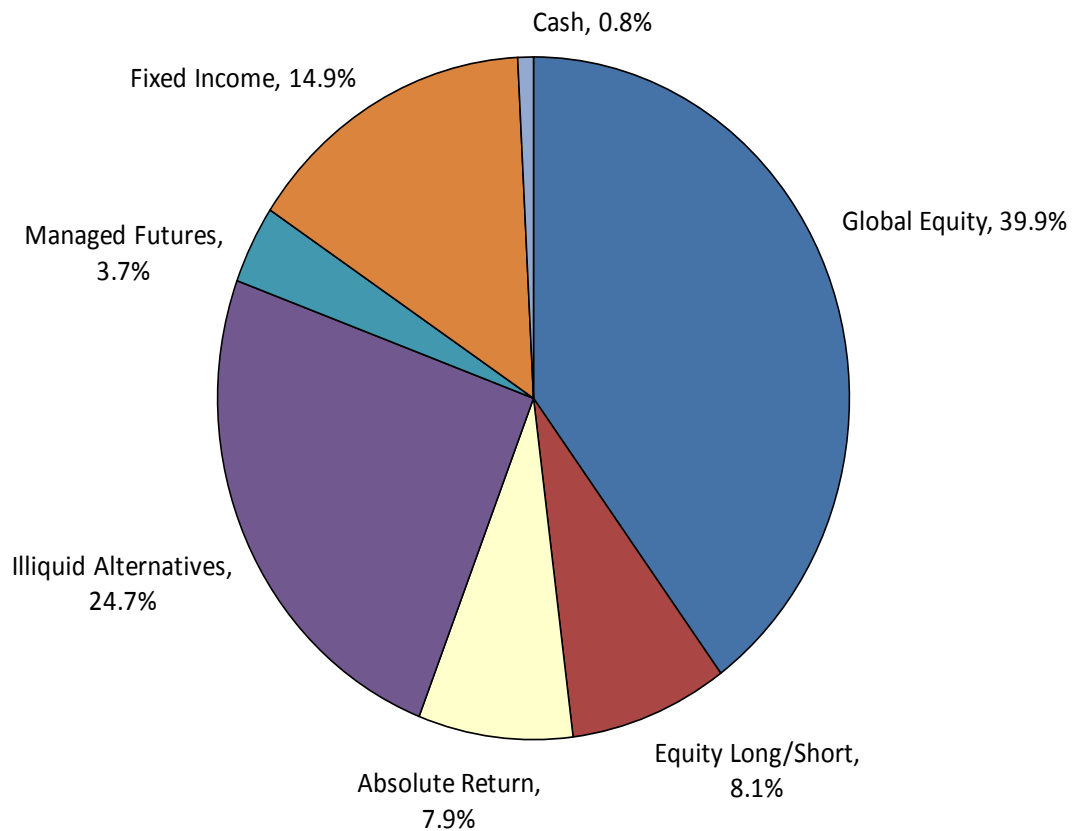


Table 7 - Reconciliation of Plan Net Assets

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



Table 8 - Development of Actuarial Value of Assets

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

Fiscal Year End	Remaining Deferrals of Excess/(Shortfall) of Investment Income (1)	Offsetting of Gains/(Losses) (2)	Net Deferrals Remaining (3) = (1) + (2)	Years Remaining (4)	Recognized for this valuation (5) = (3) / (4)	Remaining after this valuation (6) = (3) - (5)
2015	\$ 0	\$ 0	\$ 0	1	\$ 0	\$ 0
2016	0	0	0	2	0	0
2017	0	0	0	3	0	0
2018	(88,790,342)	88,790,342	0	4	0	0
2019	182,920,516	(88,790,342)	94,130,174	5	18,826,035	75,304,139
Total	\$ 94,130,174	\$ 0	\$ 94,130,174		\$ 18,826,035	\$ 75,304,139

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

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



Table 9 - Investment Yields

Item	Market Value	Actuarial Value
1. Assets as of January 1, 2019 (A)	\$ 2,526,692,808	\$ 2,615,483,150
2. Contributions during FY19	170,970,501	170,970,501
3. Benefit payments made during FY19	(83,822,331)	(83,822,331)
4. Refunds of contributions during FY19	(3,200,062)	(3,200,062)
5. Administrative expenses during FY19	(3,524,983)	(3,524,983)
6. Investment return during FY19	<u>368,819,146</u>	<u>204,724,665</u>
7. Assets as of January 1, 2020 (B): (1 + 2 + 3 + 4 + 5 + 6)	\$ 2,975,935,079	\$ 2,900,630,940
8. Approximate rate of return on average invested assets		
a. Net investment income (I)	\$ 368,819,146	\$ 204,724,665
b. Estimated return based on $(2I / (A + B - I))$	14.37%	7.71%

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

Item	Valuation as of January 1, 2020	Valuation as of January 1, 2019
1. Actuarial assets, prior valuation	\$ 2,615,483,150	\$ 2,353,241,861
2. Total contributions since prior valuation	\$ 170,970,501	\$ 199,491,406
3. Benefits, refunds, and administrative expense since prior valuation	\$ (90,547,376)	\$ (83,827,692)
4. Assumed net investment income at actuarial rate%*		
a. Beginning assets	\$ 183,083,820	\$ 164,726,930
b. Contributions	5,983,968	6,982,199
c. Benefits, refunds paid, and administrative expense	(3,169,158)	(2,933,969)
e. Total	\$ 185,898,630	\$ 168,775,160
5. Expected actuarial assets (1 + 2 + 3 + 4)	\$ 2,881,804,905	\$ 2,637,680,735
6. Actual actuarial assets, this valuation	\$ 2,900,630,940	\$ 2,615,483,150
7. Asset gain/(loss) (6 - 5)	\$ 18,826,035	\$ (22,197,585)
	Gain	Loss

*7.0% assumed as of January 1, 2019



Table 11 - History of Investment Return Rates

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

History of Asset Returns

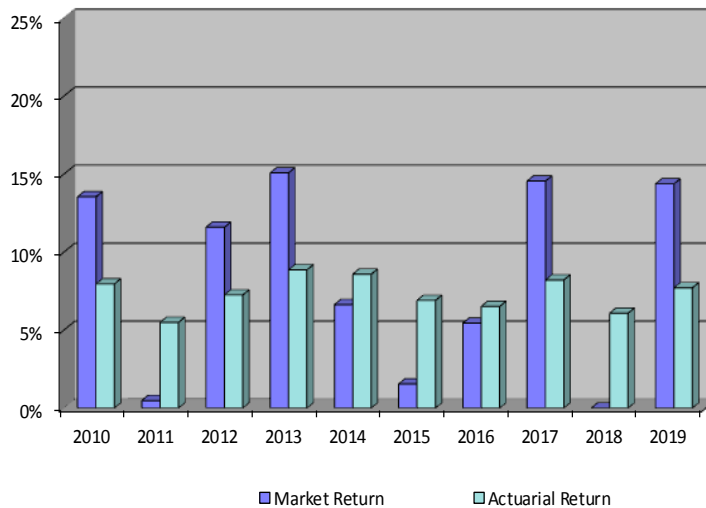


Table 12 - Schedule of Funding Progress

Date	Actuarial Value of Assets (AVA)	Actuarial Accrued Liability (AAL)	Unfunded Actuarial		Annual Payroll	UAAL as % of Payroll (4)/(6)
			Accrued Liability (UAAL) (3) - (2)	Funded Ratio (2)/(3)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
January 1, 2003	\$ 424,088,589	\$ 371,056,405	\$ (53,032,184)	114.3%	\$ 172,625,858	(30.7%)
January 1, 2004	473,006,658	426,673,675	(46,332,983)	110.9%	189,359,234	(24.5%)
January 1, 2005	557,949,693	495,915,617	(62,034,076)	112.5%	217,752,582	(28.5%)
January 1, 2006	681,193,087	569,819,934	(111,373,153)	119.5%	246,693,626	(45.1%)
January 1, 2007	801,426,848	654,097,657	(147,329,192)	122.5%	271,906,902	(54.2%)
January 1, 2008	950,114,346	795,499,983	(154,614,363)	119.4%	312,857,166	(49.4%)
January 1, 2009	856,090,014	847,821,122	(8,268,892)	101.0%	337,918,774	(2.4%)
January 1, 2010	963,500,681	963,300,852	(199,829)	100.0%	363,265,902	(0.1%)
January 1, 2011	1,080,284,447	1,049,622,033	(30,662,414)	102.9%	353,484,986	(8.7%)
January 1, 2012	1,225,537,747	1,271,490,169	45,952,422	96.4%	384,803,645	11.9%
January 1, 2013	1,374,576,631	1,404,607,765	30,031,134	97.9%	406,258,662	7.4%
January 1, 2014	1,546,834,469	1,533,631,141	(13,203,328)	100.9%	426,690,241	(3.1%)
January 1, 2015	1,714,971,185	1,652,901,084	(62,070,101)	103.8%	441,313,862	(14.1%)
January 1, 2016	1,890,604,068	1,846,961,999	(43,642,069)	102.4%	473,359,565	(9.2%)
January 1, 2017	2,050,113,711	2,021,526,883	(28,586,828)	101.4%	513,837,288	(5.6%)
January 1, 2018	2,353,241,861	2,269,410,684	(83,831,177)	103.7%	577,624,013	(14.5%)
January 1, 2019	2,615,483,150	2,653,120,261	37,637,111	98.6%	659,583,375	5.7%
January 1, 2020	2,900,630,940	2,972,018,080	71,387,140	97.6%	729,345,875	9.8%

Limitations of Funded Status Measurements

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

With regard to any funded status measurements presented in this report:

- (1) The measurement is inappropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations.
- (2) The measurement alone is inappropriate for assessing the need for or the amount of future employer contributions.
- (3) The measurement would produce a different result if the market value of assets were used instead of the actuarial value of assets, unless the market value of assets is used in the measurement.



Table 13 - Solvency Test

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

\$ amounts in '000s



Table 14 - Cash Flow Analysis

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

* Results for 2020, 2021, & 2022 are based on expected contributions, expected benefit payments, and assumed investment return of 7.0%.

Expected contributions are based on combined employee and employer rate of 19.0%/20.0%/21.0% and 3.5% annual payroll growth, for 2020/2021/2022, respectively.

Expected benefit payments are based on current plan benefits and expected retirements, terminations, and mortality.

Assets are assumed to increase at the annual return of 7.0% with all cash flow occurring in the middle of the year.

\$ amounts in '000s



Table 15 - Membership Data

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

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

Table 16 - Historical Summary of Active Member Data

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



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

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



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

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

*Includes beneficiaries of deceased members with a deferred benefit.

**Includes benefit adjustments



Table 19 - Summary of Members and Adjusted Payroll by Employer

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



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

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



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

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



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

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



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

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



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

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



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

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



SECTION IV

APPENDICES

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

I. Valuation Date

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

II. Actuarial Cost Method

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

1. The valuation is prepared on the projected benefit basis. The present value of each participant's expected benefit payable at retirement or termination is determined, based on age, service, sex, compensation, and the interest rate assumed to be earned in the future (7.0%). The calculations take into account the probability of a participant's death or termination of employment prior to becoming eligible for a benefit, as well as the possibility of his terminating with a service benefit. Future salary increases are also anticipated. The present value of the expected benefits payable on account of the active participants is added to the present value of the expected future payments to retired participants and beneficiaries to obtain the present value of all expected benefits payable from the Plan on account of the present group of participants and beneficiaries.
2. The employer contributions required to support the benefits of the Plan are determined following a level funding approach, and consist of a normal cost contribution and an accrued liability contribution.
3. The normal cost contribution is determined using the Entry Age Normal method. Under this method, a calculation is made to determine the average uniform and constant percentage rate of employer contribution which, if applied to the compensation of each participant during the entire period of his anticipated covered service (from hire), would be required in addition to the contributions of the participant to meet the cost of all benefits payable on their behalf.
4. The unfunded accrued liability contributions are determined by subtracting the actuarial value of assets from the actuarial accrued liability and amortizing the result over 30 years from the valuation date as a level percentage of payroll. It is assumed that payments are made monthly throughout the year.

III. Actuarial Value of Assets

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

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

IV. Actuarial Assumptions

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

A. Economic Assumptions

1. Investment return: 7.0% per annum, compounded annually, composed of an assumed 2.5% inflation rate and a 4.5% real rate of return. This rate represents the assumed return, net of all investment expenses.
2. Salary increase rate: Inflation rate of 2.50%, plus productivity component of 1.75%, plus step-rate/ promotional component as shown on the following page:

Years of Service	Annual Step-rate/ Promotional Rate	Total Annual Rate of Increase Including 2.50% Inflation Component and 1.75% Productivity Component
(1)	(2)	(4)
1	7.00%	11.25%
2	7.00%	11.25%
3	6.50%	10.75%
4	6.00%	10.25%
5	3.50%	7.75%
6	1.50%	5.75%
7	1.50%	5.75%
8	1.00%	5.25%
9	1.00%	5.25%
10	0.75%	5.00%
11	0.75%	5.00%
12	0.50%	4.75%
13	0.50%	4.75%
14	0.25%	4.50%
15	0.00%	4.25%

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

3. Payroll growth rate: In the amortization of surplus assets and funding projections, payroll is assumed to increase 3.50% per year. This increase rate is primarily due to the effect of inflation on salaries, with no allowance for future membership growth.

B. Demographic Assumptions

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

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

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

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

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

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

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

Annual Rate per 1,000 Members		
Age	Occupational Disability Rates	Total Disability Rates
(1)	(2)	(3)
25	0.48	0.02
30	2.26	0.17
35	3.05	0.34
40	4.48	0.52
45	5.53	0.72
50	8.22	0.94
55	11.56	1.17

Disability rates are turned off at eligibility for normal retirement.

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

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

5. Retirement rates:

Age-Based Retirement rates, for members with more than 25 years of service

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

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

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

Service-Based Retirement rates*

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

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

C. Other Assumptions

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

8. Percent electing deferred termination benefit: Vested terminating members are assumed to elect a refund or a deferred benefit, whichever is more valuable at the time of termination.
9. No surviving spouse will remarry and there will be no children's benefit.
10. Assumed age for commencement of deferred benefits: Members electing to receive a deferred benefit are assumed to commence receipt at the first age at which unreduced benefits are available.
11. Pay increase timing: Beginning of (fiscal) year. This is equivalent to assuming that reported pays represent amounts paid to members during the year ended on the valuation date.
12. Decrement timing: Decrements of all types are assumed to occur mid-year.
13. Eligibility testing: Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
14. Decrement relativity: Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
15. Incidence of Contributions: Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report, and the actual payroll payable at the time contributions are made.
16. Benefit Service: All members are assumed to accrue 1 year of service each year. Exact fractional service is used to determine the amount of benefit payable.
17. Inactive Population: All members included in the inactive non-vested population with at least 10 years of service are valued using two times member contributions.

D. Participant Data

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

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

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

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

E. Allocation to SRA

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

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

F. Changes to the assumptions:

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

SUMMARY OF BENEFIT PROVISIONS

Plan Description

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

Employers once had the option to elect to withdraw from the Plan, but a change in state statutes permitted no further withdrawals after January 1, 1988, unless the employer elects into and is determined to be eligible to participate in the Statewide Money Purchase Plan. In 2003, legislation was enacted to allow departments who cover their firefighters and police officers in money purchase plans to elect coverage under the FPPA Defined Benefit System. A reentry moratorium was in place from late 2012 through 2014 as the Statewide Defined Benefit Plan Member Contribution Election was completed. The board of directors lifted the moratorium for partial reentry in 2017 to align with their strategic plan objective to expand membership into FPPA’s retirement plans.

As of August 5, 2003, the Plan may include clerical and other personnel from fire districts whose services are auxiliary to fire protection. As of January 1, 2020, Colorado police and sheriff departments who participate in Social Security have the option of affiliating for coverage under the Defined Benefit System and the Statewide Death and Disability Plan.

The Plan assets are included in the Fire & Police Members’ Benefit Investment Fund Long-Term Pool and the Fire & Police Members’ Self-Directed Investment Fund (for Deferred Retirement Option Plan “DROP” assets and Separate Retirement Account “SRA” assets from eligible retired members.)

Plan Year

A twelve-month period ending December 31.

Members Included

Members included are active, full-time salaried employees of a participating municipality, fire protection district, fire authority, or county improvement district normally serving at least 1,600 hours in a calendar year and whose duties are directly involved with the provision of police or fire



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

Also included are employees of any employer that covers members under the federal Social Security Act or any county that chooses to affiliate with the Fire & Police Pension Association and includes all personnel employed by a sheriff expected to work 1,600 hours or more in a calendar year who are directly involved with the provision of law enforcement or fire protection as certified by the county.

Compensation Considered (Base Salary)

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

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

- 2) Accumulated vacation leave pay will also be included if a Member completes his/her service requirement for purposes of Normal retirement while exhausting accumulated vacation leave.

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

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

- 5) Base salary shall not include overtime pay (except as noted in the preceding sentence), step-up pay or other pay for temporarily acting in a higher rank, uniform allowances, accumulated sick leave pay, accumulated vacation leave pay (except as noted in Section 2) above), and other forms of extra pay (including Member Contributions which are paid by the employer and not deducted from the Member's salary).

Contribution Rates

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

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

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

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



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

Statewide Defined Benefit Plan - Contribution Rate Implementation Schedule

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

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

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

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

Highest Average Salaries (HAS)

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

Normal Retirement Date

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

Normal Retirement Benefit

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



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

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

Early Retirement Benefit

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

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

Terminated Vested Benefit

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

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

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

Deferred Retirement Benefit

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



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

Severance Benefit

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

The member receives a lump-sum payment equal to the sum of their member contributions. 5 percent as interest is credited on these contributions.

Death Benefit of Active Members

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

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

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

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

Forms of Payment

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

Normal Option – The retiree receives a monthly pension benefit for their life. No monthly benefits are paid to a beneficiary following the retiree's death. However, if at the time of the member's death, they have not recouped in pension payments the amount of the member contributions



(including all funds paid in to purchase service credit), the remaining funds plus 5% as interest would be paid to the member's beneficiary or estate as a lump sum.

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

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

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

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

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



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

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

Benefit Adjustments for Benefits in Pay Status

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

Stabilization Reserve Account (SRA)

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

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



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

Deferred Retirement Option Plan (DROP)

A member may elect to participate in the DROP after reaching eligibility for normal retirement, early retirement, or vested retirement and age 55. A member can continue to work while participating in the DROP, but must terminate employment within five years of entry into the DROP. The member's percentage of retirement benefit is determined at the time of entry into the DROP. The monthly payments that begin at entry into the DROP are accumulated in a DROP account until the member terminates service, at which time the DROP accumulated benefits can be paid as periodic installments, a lump sum, or if desired a member may elect to convert the DROP to a lifetime monthly benefit with survivor benefits. While participating in DROP, the member continues to make pension contributions, which are credited to the DROP. Effective January 1, 2003, the member shall self-direct the investments of their DROP funds.

Investment Pool

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

RISKS ASSOCIATED WITH MEASURING THE ACCRUED LIABILITY AND ACTUARIALLY DETERMINED CONTRIBUTION

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

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions due to changing conditions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period, or additional cost or contribution requirements based on the Plan's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

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

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



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

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

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

Plan Maturity Measures

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

	2020	2019	2018
Ratio of the market value of assets to total payroll	4.1	3.8	4.2
Ratio of actuarial accrued liability to payroll	3.9	3.8	3.8
Ratio of actives to retirees and beneficiaries	5.2	5.3	5.3
Net cash flow as a percentage of market value of assets	2.7%	4.6%	5.4%
Duration of the actuarial accrued liability	13.5	13.7	13.2

RATIO OF MARKET VALUE OF ASSETS TO PAYROLL:

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

RATIO OF ACTUARIAL ACCRUED LIABILITY TO PAYROLL:

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

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

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

RATIO OF ACTIVES TO RETIREES AND BENEFICIARIES:

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

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

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

DURATION OF LIABILITIES:

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