Commonwealth of Pennsylvania State Employees' Retirement System

2019 Actuarial Report

COMMONWEALTH OF PENNSYLVANIA

STATE EMPLOYEES' RETIREMENT SYSTEM

2019 ACTUARIAL REPORT

DEFINED BENEFIT PLAN

KORN FERRY
JUNE 10, 2020

KORN FERRY®

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June 10, 2020

Ms. Terrill J. Sanchez
Executive Director
State Employees' Retirement System
30 North Third Street - Suite 150
Harrisburg, PA 17101-1716

Dear Ms. Sanchez:

The purpose of this letter and the enclosed report is to certify the actuarial adequacy of the contributions being made by the Commonwealth of Pennsylvania and other participating agencies to the Pennsylvania State Employees' Retirement System (SERS), and to discuss the approach currently being taken toward meeting the financing objectives of the plan. Use of this letter and the enclosed for purposes other than stated may not be appropriate. The results provided herein are based upon the December 31, 2019 annual actuarial valuation.

The funding objective of the plan is set forth in the State Employees' Retirement Code (SERC). The annual employer contribution is equal to the sum of the following for the commonwealth fiscal year beginning July 1, 2020:

(1) The employer share of the normal cost.
(2) The fresh start amortization of the December 31, 2009 unfunded liability over a 30-year period beginning July 1, 2010 and ending on June 30, 2040.
(3) The amortization of the change in liability due to Act 2010-120 (Act 120) over a 30-year period beginning July 1, 2011 and ending on June 30, 2041.
(4) The amortization of changes in liability due to actual experience differing from assumed experience after December 31, 2009 over 30-year periods beginning with the July following the actuarial funding valuation determining such changes.
(5) The extra contribution to return Act 2017-5 savings.
(6) The amortization of legislated benefit changes, including cost-of-living increases, over 10-year periods beginning with the July following the actuarial valuation determining such changes. (Note: There are currently no 10-year amortizations being funded.)

The amortization payments are level dollar amounts over the remaining applicable amortization periods. The employer cost is determined as a percent of retirement covered compensation. The total employer cost is the average contribution amount that needs to be received from the employer groups participating in the system. Some employer groups contribute a higher percent of compensation and others contribute a lower percent of compensation, depending on the benefits payable to each group's employees.

The actuarial valuation is based on financial and participant data, which is supplied by SERS staff. We rely on that data and review it for consistency and reasonableness prior to using it in the valuation. The accuracy of the valuation results is dependent on the accuracy of the supplied information.

The actuarial valuation uses various economic and demographic assumptions regarding future plan experience. The current set of assumptions used in the valuation, with the exception of the investment return and inflation assumptions, was adopted by the State Employees' Retirement Board (the Board) based upon our recommendations included in the March 2016 report on the eighteenth investigation of actuarial experience of SERS during the years 2011 through 2015. The investment return and inflation assumptions are selected by the Board based upon a review of the actual plan experience and the prevalent economic outlook. As a result of the review undertaken during June of 2019, the Board approved a reduction in the annual investment return assumption from 7.25% to 7.125%. The change was implemented with the December 31, 2019 actuarial valuation. We will continue to closely monitor the investment return assumption and will recommend changing it if conditions warrant such change.

Apart from the statutory funding requirements set forth in the SERC, there are also separate accounting standards to which SERS is subject for financial reporting purposes. Governmental Accounting Standards Board (GASB) Statement No. 67, *Financial Reporting for Pension Plans*, replaced the requirements of GASB Statement No. 25, *Financial Reporting for Defined Benefit Pension Plans and Note Disclosures for Defined Contribution Plans*, effective for financial statements for the fiscal year ended June 30, 2014. GASB Statement No. 68, *Accounting and Financial Reporting for Pensions*, which establishes standards for accounting and financial reporting by state and local governments for pensions, replaced the requirements of GASB Statement No. 27, *Accounting for Pensions by State and Local Governmental Employers*, effective for the fiscal year ended June 30, 2015. The actuarial information required under Statements No. 67 and 68 is not included in this report. These results were provided separately to SERS for inclusion in their annual financial reporting to the public and to the participating employers of the system.

Based upon the valuation results, it is our opinion that, provided future employer contributions are made in accordance with current law, the Pennsylvania State Employees' Retirement System is, and will continue to be, adequately funded, in accordance with generally accepted actuarial principles and procedures.

It should be noted that, during June of 2017, Governor Tom Wolf signed into law Act 2017-5. Act 2017-5 fundamentally changed retirement options for most new hires beginning January 1, 2019. This legislation introduced two new hybrid defined benefit (DB)/defined contribution (DC) options and a straight DC option. New classes of service now apply to most State employees who first become SERS members on or after January 1, 2019; however, most hazardous duty employees are exempt from the new plan design.

Please note that future actuarial measurements can differ significantly from current measurements due to such factors as plan experience differing from that anticipated by the assumptions, changes in future assumptions, and changes in plan provisions or applicable law. It is beyond the scope of our annual actuarial valuation to perform an analysis of the potential range of such future differences in measurement; however, we have performed such an analysis and presented the results in a separate Stress Testing and Risk Assessment report, dated December 5, 2019, which is available on the SERS website.

Actuarial Certification

To the best of our knowledge, this report is complete and accurate, and all costs and liabilities have been determined in accordance with the applicable actuarial standards of practice and on the basis of actuarial assumptions and methods which are reasonable (taking into account the past experience of SERS and reasonable expectations) and which represent our best estimate of anticipated experience under the plan.

The actuaries certifying this valuation are members of the Society of Actuaries or other professional actuarial organizations and meet the Qualification Standards of the American Academy of Actuaries for purposes of issuing Statements of Actuarial Opinion.

Respectfully submitted,
Korn Ferry

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State Employees' Retirement System
Valuation Highlights

		December 31, 2019 Valuation		December 31, 2018 Valuation
Summary of Employer Contributions as a Percent of Total Compensation				
SERS Plan Contribution				
Normal Cost		1.67%		1.25%
Amortization of Liabilities		31.12%		31.57%
Extra Contribution to Return Act 5 Savings		0.66%		0.71%
Total SERS Plan Contribution		33.45%		33.53%
Benefits Completion Plan Contribution		0.03%		0.06%
Total Contribution		33.48%		33.59%
Demographic Characteristics of the Population				
Active Participants:				
Number		102,850		103,007
Average age		46.3		46.3
Average service		11.2		11.3
Average annualized covered compensation	$	61,532	$	59,984
Total annualized covered compensation	$	6,328,566,000	$	6,178,772,000
Funding payroll	$	6,657,541,000	$	6,469,401,000
Annuitants and Beneficiaries:				
Number		132,731		131,007
Average age		69.8		69.6
Total annual pension	$	3,108,979,484	$	3,004,899,804
Inactive and Vested Participants:				
Number		6,752		7,030
Assets				
Market Value of Assets	$	31,092,664,894	$	26,934,733,379
Actuarial Value of Assets	$	29,934,023,548	$	28,989,607,125
Funded Status (Market Assets)		58.7%		52.0%
Funded Status (Actuarial Assets)		56.5%		56.0%

Note: The terms "employee", "member" and "participant" are used interchangeably throughout this report; however, there are distinct differences between them. In general, an "employee" is an individual who is actively employed by the Commonwealth, a "member" is an employee who is covered by the SERS defined benefit (DB) plan and a "participant" is an employee who is covered by the SERS defined contribution (DC) plan.

Employer Contribution Rate by Group
Fiscal Year 2020 - 2021

	SERS Plan*	Benefits Completion Plan	Legacy Subtotal	Defined Contribution Plan	Total
Class A-5 Members:	17.31%	0.03%	17.34%	2.25%	19.59%
Class A-6 Members:	17.56%	0.03%	17.59%	2.00%	19.59%
DC Plan Only Members:	16.06%	0.00%	16.06%	3.50%	19.56%
Class A-3 and A-4 Members:					
Age 65 Retirement	25.44%	0.03%	25.47%	0.00%	25.47%
Age 55 Retirement	27.67%	0.03%	27.70%	0.00%	27.70%
Park Rangers	27.74%	0.03%	27.77%	0.00%	27.77%
Capitol Police	27.74%	0.03%	27.77%	0.00%	27.77%
State Police	44.49%	0.03%	44.52%	0.00%	44.52%
Class AA Members:					
Age 60 Retirement	36.81%	0.03%	36.84%	0.00%	36.84%
Age 50 Retirement	40.05%	0.03%	40.08%	0.00%	40.08%
Park Rangers	39.92%	0.03%	39.95%	0.00%	39.95%
Capitol Police	39.92%	0.03%	39.95%	0.00%	39.95%
Enforcement Officers	40.05%	0.03%	40.08%	0.00%	40.08%
Class A Members:					
Age 60 Retirement	29.45%	0.03%	29.48%	0.00%	29.48%
Age 50 Retirement	32.04%	0.03%	32.07%	0.00%	32.07%
Park Rangers	32.04%	0.03%	32.07%	0.00%	32.07%
Capitol Police	32.04%	0.03%	32.07%	0.00%	32.07%
State Police	49.38%	0.03%	49.41%	0.00%	49.41%
Enforcement Officers	32.04%	0.03%	32.07%	0.00%	32.07%
Class D-4 Legislators	48.06%	0.03%	48.09%	0.00%	48.09%
Class E Members	46.67%	0.03%	46.70%	0.00%	46.70%

*Includes 0.66% extra contribution to return Act 5 savings for all groups

The above group rates result in employer contribution rates (expressed as a percentage of total projected covered compensation for active members in fiscal year 2020-2021) of 33.45% for the SERS DB Plan, 0.03% for the Benefits Completion Plan and 33.48% in Total for the DB Plan.

General Discussion

The liabilities and costs in this report are based upon actuarial assumptions adopted by the State Employees' Retirement Board (the Board) and funding procedures specified in the State Employees' Retirement Code (SERC). The SERC requires that the Board conduct a study of the actuarial experience of SERS every five years as a basis for setting the actuarial assumptions used in the valuation. A five-year study was conducted and delivered to the Board in March of 2016. The Board approved the recommendations of the actuary and the new assumptions were first used in the December 31, 2015 valuation.

The most important actuarial assumptions are the investment return assumption, also known as the valuation interest rate assumption, and the salary growth assumption. The investment return experience is reviewed annually and as a part of the normal five-year experience study cycle. As a result of the review undertaken during June of 2019, the Board approved a reduction in the annual investment return assumption from 7.25% to 7.125%. The change was implemented with the December 31, 2019 actuarial valuation.

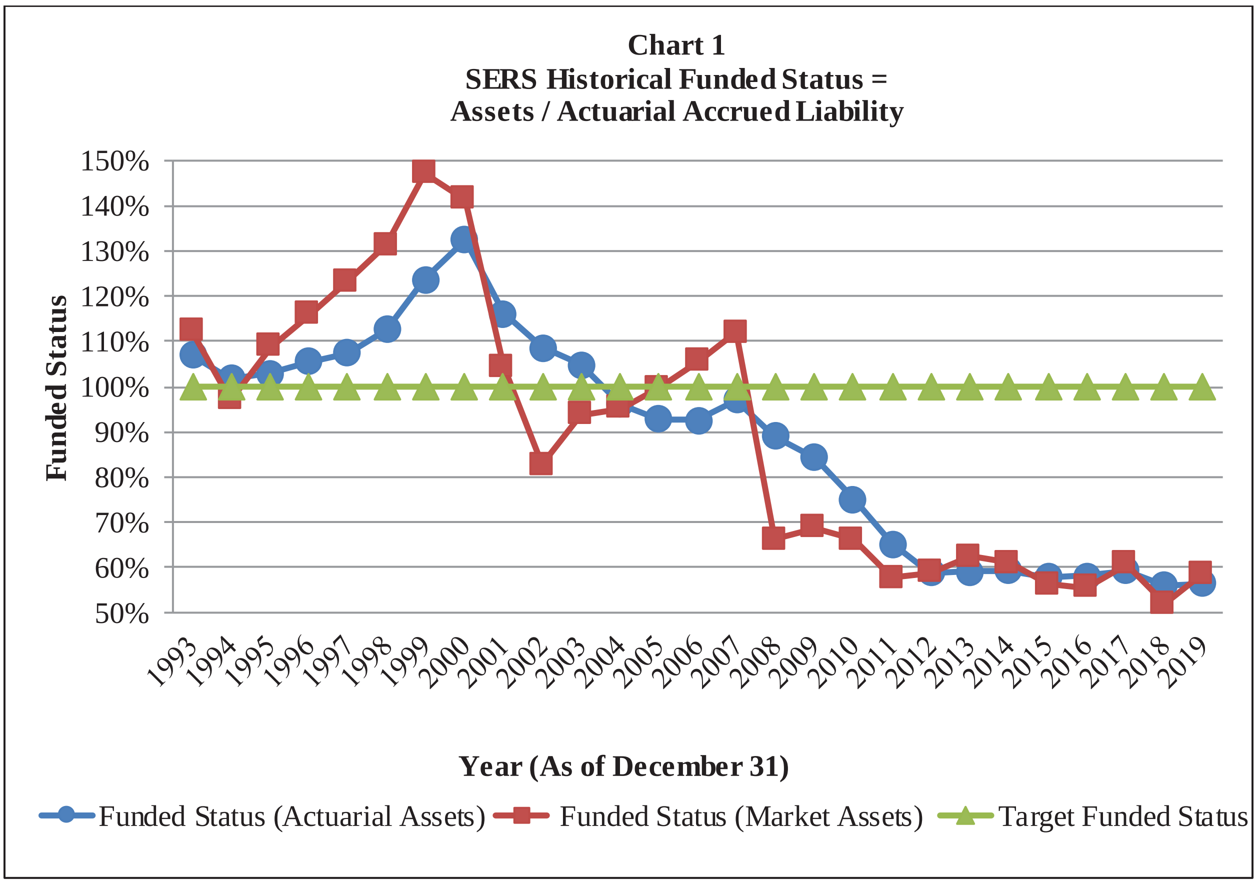
Both the investment return and the salary growth assumptions are based upon an underlying inflation rate assumption of 2.60 percent per year. Salary growth is the total of assumed increases in salary rates and career salary growth. It is generally assumed that the salary rates will increase by 2.9 percent per year due to general salary schedule increases and that career salary growth (promotion and longevity growth) will average an additional 2.65 percent per year. Thus, the total average salary increase for an individual will generally be 5.55 percent per year.

The employer contribution rate is determined as a percent of covered compensation that is the total of (1) the employer normal cost percent and (2) the net amortization of the unfunded liability and (3) the extra contribution to return Act 5 savings, but not less than any applicable minimum contribution prescribed by the SERC. The final total employer contribution rate as of December 31, 2019 is 33.45 percent of covered compensation, which is the sum of (1) the employer normal cost of 1.67 percent of compensation plus (2) the net amortization of the unfunded liability of 31.12 percent of compensation plus (3) the extra contribution to return Act 5 savings of 0.66 percent. See Schedule P for further discussions of the Act 2010-120 minimum and the Act 2017-5 extra contributions to return savings.

The funded ratio is the ratio of assets to the actuarial accrued liability. As a consequence of the global economic downturn, SERS' funded status, as measured by the funded ratio, declined significantly during 2008, to a level of 66.2 percent based on market value and 89.0 percent based on actuarial value of plan assets as of December 31, 2008. As a result of somewhat more favorable investment results during calendar years 2009 and 2010, the funded ratio based on the market value of assets as of December 31, 2010 was 66.1 percent; however, the funded ratio based on the actuarial value of assets (which recognizes investment losses over a five-year period) decreased to 75.2 percent as of December 31, 2010. With investment results well below expectations during calendar 2011, combined with an increase in the actuarial accrued liability due to the December 31, 2011 interest assumption decrease, the funded ratio based on market value of assets decreased from 66.1 percent to 57.6 percent, and the funded ratio based on actuarial value of assets decreased from 75.2 percent to 65.3 percent. Investment results above expectations in 2012 resulted in an increase in the funded ratio based on market value from 57.6 percent to 59.0 percent. However, with the final 20 percent of the 2008 investment loss being recognized in 2012, there was a decrease in the funded ratio based on actuarial value from 65.3 percent to 58.8 percent. Favorable investment results in 2013 resulted in an increase in both the market and actuarial value funded ratios from 59.0 percent to 62.4 percent, and from 58.8 percent to 59.2 percent, respectively.

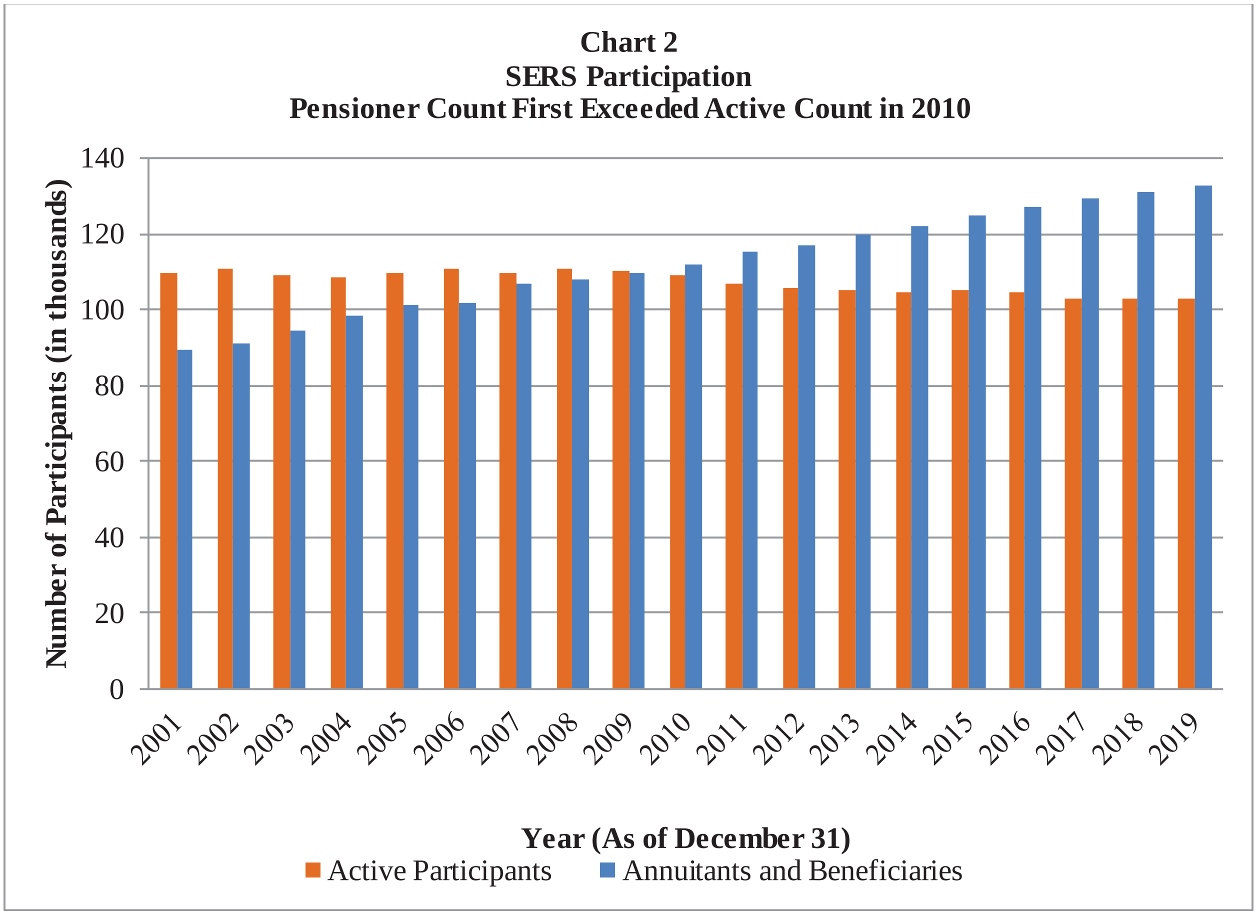
A market return below expectations in 2014 resulted in a decrease in the market value funded ratio from 62.4 percent to 61.1 percent and recognition of prior asset gains through the smoothing method resulted in the actuarial value funded ratio increasing from 59.2 percent to 59.4 percent. In 2015, a second consecutive annual market return below expectations resulted in decreases in the market value funded ratio from 61.1 percent to 56.2 percent and in the smoothed actuarial value funded ratio from 59.4 percent to 58.0 percent. In 2016, the actuarial accrued liability increased due to the reduction in the investment return (interest rate) assumption. The lower than expected investment return on a market value basis was insufficient to offset the increased liability, resulting in a decrease in the market value funded ratio from 56.2 percent to 55.5 percent, while the actuarial return was sufficient to slightly increase the actuarial value funded ratio from 58.0 percent to 58.1 percent. Favorable investment results in 2017 resulted in an increase in both the market and actuarial value funded ratios from 55.5 percent to 60.7 percent, and from 58.1 percent to 59.4 percent, respectively. A market return well below expectations in 2018 resulted in a decrease in both the market and actuarial value funded ratios from 60.7 percent to 52.0 percent, and from 59.4 percent to 56.0 percent, respectively. A market return well above expectations in 2019 resulted in an increase in both the market and actuarial value funded ratios from 52.0 percent to 58.7 percent, and from 56.0 percent to 56.5 percent, respectively.

Chart 1 below presents a history of SERS funded ratios, relative to the 100% target funded status.



During 2010, the count of pensioners exceeded the count of active participants for the first time in the history of SERS. As of December 31, 2019, the count of pensioners (132,731) further exceeds the count of active participants (102,850), a clear sign of a mature retirement system. Chart 2 below illustrates the maturing of the SERS population since 2001.

Although it was noted previously that the interest rate and salary growth are the most important actuarial assumptions, the maturity of the SERS population heightens the importance of the mortality assumptions. Thus, the updates to the post-retirement mortality assumptions recommended by the actuary every five years based upon SERS' actual ongoing mortality experience, have become increasingly critical to the annual valuation process.



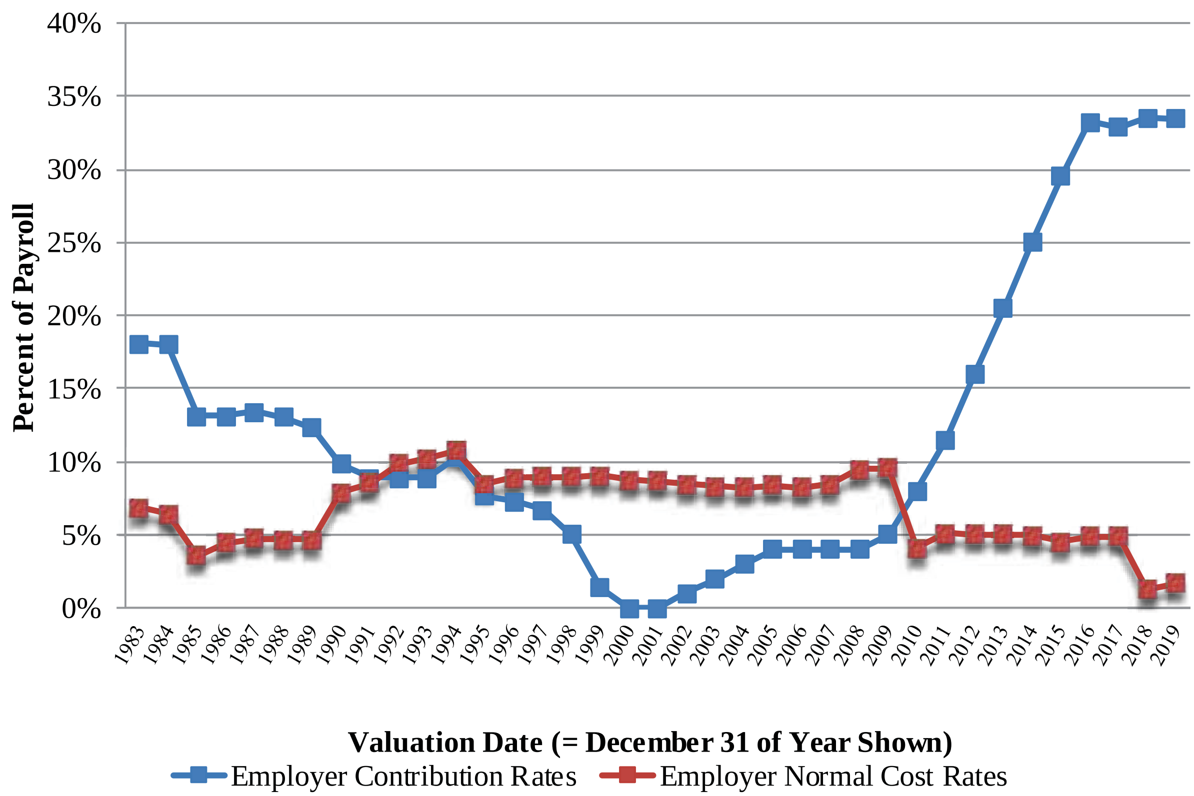
A separate and distinct Benefits Completion Plan provides benefits to certain members whose SERS benefits are limited by IRC Section 415(b) maximum benefit limitations. The Benefits Completion Plan employer contribution requirements for fiscal year 2020-2021, which were determined by a separate December 31, 2019 actuarial valuation, are presented in the Valuation Highlights herein. Otherwise, Benefits Completion Plan costs and liabilities are not included in the schedules of this report.

History of the Employer Contribution Rate

Chart 3 below shows the history of the employer contribution rate from 1983 through 2019. With some fluctuations, the general trend from 1984 through 2001 had been downward, with the rate declining from the 18 percent range in the years 1983 and 1984 to zero in 2000 and 2001. The investment returns were below the actuarial assumption (then 8.5 percent) in 2000 through 2002. The changes to the amortizations under Act 2003-40 and subsequent investment gains would have kept the contributions from increasing, if it had not been for legislated floors that caused the employer contributions to increase between 2002 and 2005.

From 2006 through 2015, actual employer contribution rates were at levels prescribed by law, increasing each year since 2009. Effective with the December 31, 2016 valuation, for the first time since 2010, the employer contribution rate was uncollared (that is, no longer limited by the Act 2010-120 rate collars). Note that the current valuation employer contribution rate shown below (33.45 percent as of December 31, 2019) represents a decrease versus the prior valuation contribution rate (33.53 percent as of December 31, 2018).

Chart 3
SERS Historical Employer Contribution Rates



The total employer cost is the actual contribution rate during the succeeding fiscal year. For instance, the rate of 33.45 percent of covered compensation for the December 31, 2019 valuation date will be the employer contribution rate for the fiscal year beginning July 1, 2020.

History of Inflation, Investment Return and Salary Growth

Table 1 below shows the rate of inflation, the nominal and real investment return based on the market value of assets, and the nominal and real salary growth for the past twenty years. The nominal rates are the actual investment rate and salary growth. The real rates are the nominal rates adjusted by removing inflation. The inflation rates shown are based on the Consumer Price Index for All Urban Consumers (CPI-U) data. The nominal rate of salary growth is the percentage increase in general pay levels specified by the predominant collective bargaining agreement. This salary growth includes general pay increases, but excludes career salary growth (that is, pay changes resulting from promotions or longevity growth).

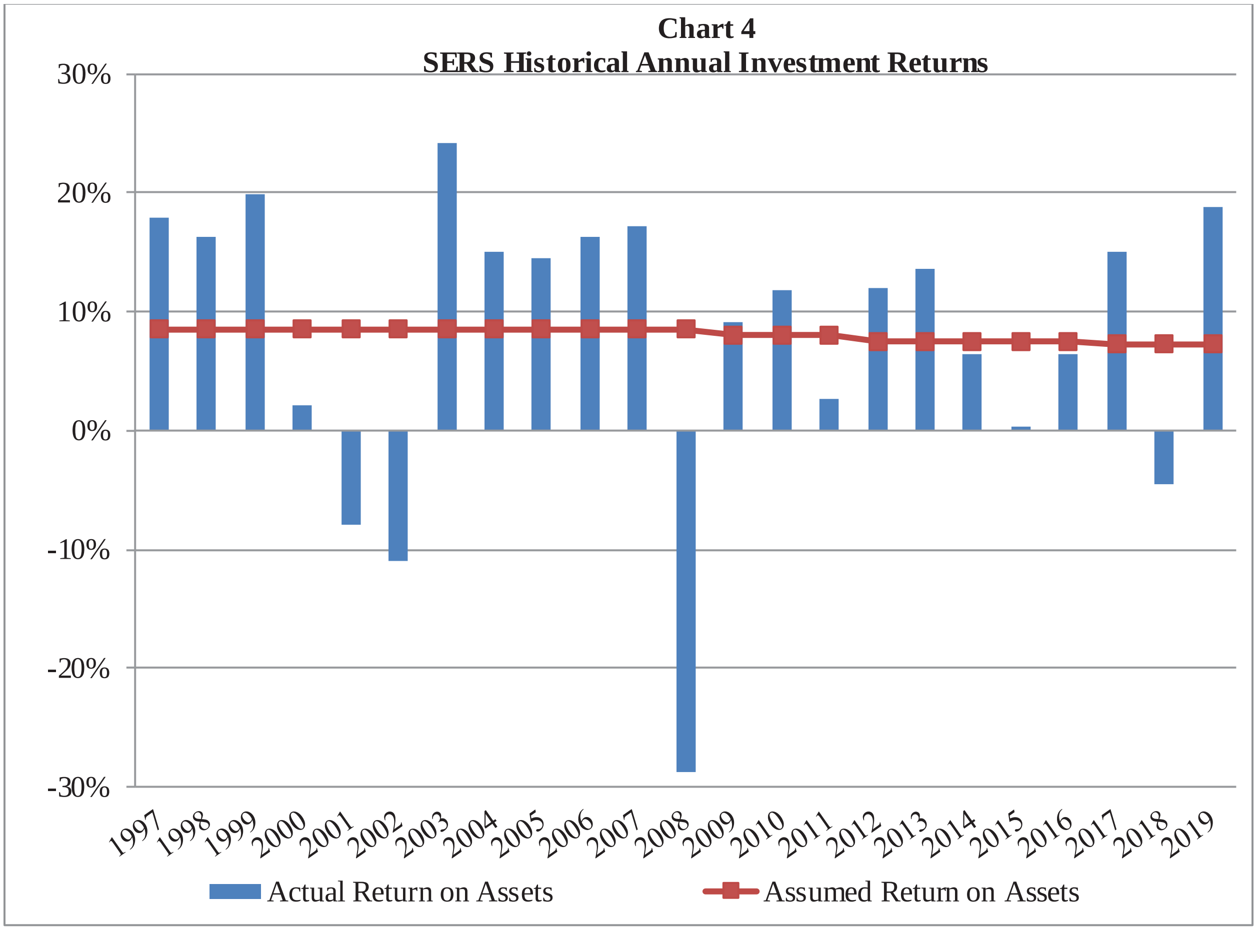
Table 1: Comparison of Annual Rates of Growth

Year	Inflation	Investment Return		Salary Growth	
		Nominal	Real	Nominal	Real
2000	3.4	2.2	(1.1)	3.0	(0.4)
2001	1.6	(7.9)	(9.3)	3.3	1.7
2002	2.4	(10.9)	(13.0)	3.5	1.1
2003	1.9	24.3	22.0	2.0	0.1
2004	3.3	15.1	11.4	1.9	(1.4)
2005	3.4	14.5	10.7	3.0	(0.4)
2006	2.5	16.4	13.6	3.5	1.0
2007	4.1	17.2	12.6	2.8	(1.2)
2008	0.1	(28.7)	(28.8)	3.0	2.9
2009	2.7	9.1	6.2	3.0	0.3
2010	1.5	11.9	10.2	3.0	1.5
2011	3.0	2.7	(0.3)	3.0	0.0
2012	1.7	12.0	10.1	1.0	(0.7)
2013	1.5	13.6	11.9	2.8	1.3
2014	0.8	6.4	5.6	3.5	2.7
2015	0.7	0.4	(0.3)	3.4	2.7
2016	2.1	6.5	4.3	1.8	(0.3)
2017	2.1	15.1	12.7	4.7	2.5
2018	1.9	(4.6)	(6.4)	5.3	3.3
2019	2.3	18.8	16.1	4.8	2.4
Average 2000-2019	**2.1%**	**5.9%**	**3.7%**	**3.1%**	**0.9%**

The averages represent the geometric averages of all of the rates over the 20-year period, not the arithmetic averages.

Chart 4 below presents a 23-year history of SERS annual investment returns relative to the actuarially assumed returns of:

- 8.5% initially adopted for calendar year 1996 and retained through 2008,
- 8.0% for 2009 through 2011,
- 7.5% for 2012 through 2016,
- 7.25% for calendar year 2017 through 2019 and
- 7.125% will be effective for calendar year 2020



Comments on Schedules

Employer Contribution Rate

Schedules A and B summarize the development of the employer contribution rate before allocation by group. The employer contribution is equal to the sum of (1) the employer share of the normal cost and (2) amortization of the unfunded liability and (3) the extra contribution to return Act 5 savings.

The normal cost is the level percentage of compensation needed to fund the liability for any prospective benefits earned by new active members over the period of their actual service. The normal cost calculation uses data for all active members in Classes A-5 and A-6 who had not yet completed one year of credited service. The employer share of the normal cost increased from 1.25 percent in 2018 to 1.67 percent in 2019. The normal cost increased due to the change in the new entrant population.

Portions of the unfunded liability are amortized over either 10 years or 30 years, as required by the SERC. Under Act 2010-120, the total December 31, 2009 unfunded liability was amortized over 30 years as part of a fresh start that combined all of the unfunded liability amortizations into one amortization. Net losses in 2010 and after were amortized over 30 years. The total unfunded liability as of December 31, 2019 was $23.04 billion. As of December 31, 2018, the total unfunded liability was $22.79 billion.

Schedule B shows the allocation of the total unfunded liability by year into those liabilities being amortized over 30 years. All amortization payments are level dollar amounts over the applicable amortization period. There are currently no 10-year amortizations. The total net charge for the amortization of the unfunded liability is 31.12 percent of the total projected covered compensation for the 2020-2021 fiscal year.

The employer contribution rate is equal to the total of the normal cost and the amortization of the unfunded liabilities and the extra contribution to return Act 5 savings, but not less than the normal cost. The employer contribution rate calculated at 33.45 percent of covered compensation will be applied for the fiscal year beginning July 1, 2020.

Employer Contribution Rates by Group

Schedule C summarizes the development of the employer contribution rate for each group of members with different benefits. The Class A-5 and A-6, age 67 retirement groups, are used to determine the base contribution rate because the majority of new members will enter those classes. The base employer contribution rate for Class A-5 and A-6 benefits is 19.56 percent of compensation.

The employer contribution rate for each class is a function of the Class A-5 and A-6 rate. Three adjustments are made to develop the Class rates. The first is to add the cost of earlier full retirement conditions if applicable. The second is to multiply by the applicable adjustment factor relative to the Class A-5 and A-6 benefit values. Third, the Park Rangers, Capitol Police and State Police Officers are also charged the amount necessary to fund the past service cost of benefit improvements that were effective in prior years. These charges are further explained in Schedule P. The complete schedule of contributions by group is shown in Table 2.

Table 2 Employer Contribution Rate by Group Fiscal Year 2020/2021 (Excluding Benefits Completion Plan Contribution)	
Class A5	
Age 67 Retirement	17.31%
Class A6	
Age 67 Retirement	17.56
DC Plan Only	16.06
Class A3/A4	
Age 65 Retirement	25.44
Age 55 Retirement	27.67
Park Rangers	27.74
Capitol Police	27.74
State Police	44.49
Class AA	
Age 60 Retirement	36.81
Age 50 Retirement	40.05
Park Rangers	39.92
Capitol Police	39.92
Enforcement Officers	40.05
Class A	
Age 60 Retirement	29.45
Age 50 Retirement	32.04
Park Rangers	32.04
Capitol Police	32.04
State Police	49.38
Enforcement Officers	32.04
Class D-4 Legislators	48.06
Class E Members	46.67

Schedule D shows the development of the shared-risk member contributions, in accordance with Act 2010-120. No shared-risk contribution applies for the 2020-2021 fiscal year.

Change in Employer Contribution Rate

Schedule E contains an analysis of the change in the employer contribution rate and unfunded liability from the 2018 to the 2019 valuation.

The largest increase in the unfunded liability – $749.9 million – resulted from a change in economic assumption (7.125% interest rate). This increase in liability resulted in an increase in the employer cost of 0.74 percent of compensation.

Another increase in the unfunded liability – $102.8 million – resulted from recognition (under the five-year asset smoothing method) of three years of asset losses totaling $1,145.6 million, which more than offset two years of asset gains of $1,042.8 million. This net loss of $102.8 million resulted in a 0.13 percent increase in the employer cost.

Another increase in the unfunded liability – $23.0 million – was due to larger than expected pay increases and resulted in an increase in the employer cost of 0.03 percent of compensation.

The largest decrease in the unfunded liability – $191.2 million – resulted from changes in the demographics of the new entrant population. The decrease in unfunded liability cost of 0.23 percent was offset by a 0.28 percent increase in the normal cost, for a net increase in cost of 0.05 percent of compensation.

Another decrease in the unfunded liability – $49.5 million – resulted from other differences between actual and expected experience of the covered population. This decrease in liability resulted in a decrease in the employer cost of 0.09 percent of compensation.

Actuarial Balance Sheet and Account Balance Transfers

Schedule F contains the actuarial balance sheet that compares the total assets and liabilities of $58.9 billion. The assets include current assets and the present value of future contributions. The liabilities include the present value of all benefits to current active and retired members.

Each year the account balances in the three benefit payment accounts are compared to the actuarial liabilities developed in the valuation. If needed, transfers are made to bring the accounts into balance with the liabilities. The accounts go out of balance during the year as a result of differences between actual experience and the reserves set for retirees. In 2019, a transfer of $586.3 million was made from the State Accumulation Account to the Annuity Reserve Account to keep the latter account in balance. There were also transfers of $1.3 million and $62.0 million from the State Accumulation Account to the Enforcement Officers' Benefit Account and the State Police Benefit Account, respectively, to keep these accounts in balance. No other transfers were necessary.

The details of these transfers are shown in Schedule G.

Accounting Disclosure Statements

Schedule H addresses disclosure information required by the Governmental Accounting Standards Board (GASB). Major changes have occurred in GASB's reporting and disclosure requirements over recent years. Specifically, GASB Statements No. 67 and 68 have replaced prior GASB Statements No. 25 and 27, respectively.

Over past years, this report presented the disclosure information required under GASB Statement No. 25, including the "Schedule of Funding Progress" and the "Schedule of Employer Contributions," and commentary relating to SERS' annual employer contributions versus the GASB minimum levels. Although these schedules have been discontinued by GASB, the information and our commentary continue to be of interest to readers of this report. Therefore, Schedule H once again includes information as required under the former GASB accounting and disclosure requirements:

Page 2 of Schedule H shows funding progress from December 31, 2000 through December 31, 2019.

Page 3 of Schedule H shows a comparison of the actual contributions to the system over recent years to the Annual Required Contribution (ARC) as defined by GASB Statement No. 25.

GASB Statement No. 25 defined the ARC to be equal to the employer normal cost plus an amount to amortize the unfunded actuarial accrued liability over an acceptable amortization period. During calendar years 2016 through 2019, actual employer contributions were equal to the ARC. Provided that employer contributions are made in accordance with current law, we expect employer contributions to continue to exceed the GASB Statement No. 25 minimum.

Schedule I shows the results of the solvency test. A short-term solvency test is one means of checking a pension system's progress under its funding program. In this solvency test, the SERS assets are compared with the actuarial accrued liabilities. The liabilities are classified into:

- Liability for active participant contributions in the Fund,
- Liability for future benefits to present annuitants and beneficiaries, and
- Liability for service already rendered by the active participants.

The schedule shows that from 1992 through 2003 the total actuarial accrued liability was fully covered by the assets. In 2004, the funded ratio dropped below 100 percent and it is currently at 56.5 percent. Absent unusual circumstances, the funded status of defined benefit plans will be below 100 percent and gradually approach 100 percent funding as liabilities become fully amortized. The State Employees' Retirement Fund had exceeded 100 percent of liabilities as a result of the high level of investment returns between 1985 and 1999. The funded ratio dropped below 100 percent largely as a result of the low investment returns of 2000 to 2002 and 2008, the Act 2001-9 benefit increases, the 2002-2003 COLAs, and the amortization schedule. Also, the implementation of Act 2010-120 for the December 31, 2010 valuation led to a lower normal cost and a higher accrued liability (and unfunded accrued liability). The reduction in the assumed annual investment return from 8.0 percent to 7.5 percent on December 31, 2011, from 7.5 percent to 7.25 percent on December 31, 2016, and from 7.25 percent to 7.125 percent on December 31, 2019 further increased the actuarial accrued liability (and unfunded accrued liability).

The current funding policy will eventually restore the funded ratio to 100 percent provided that contributions are made as provided in current law. SERS is being funded in accordance with generally accepted actuarial principles and procedures even though the accrued liabilities are temporarily greater than the assets.

Plan Assets

Schedule J summarizes the development of the actuarial value of assets as of December 31, 2019. The assets are based on the financial statements prepared by SERS. The asset valuation method smooths out year-to-year fluctuations in the market value. The approach gradually recognizes, over a 5-year period, the differences between total investment return and the actuarial assumed annual rate of return (8.5 percent prior to 2009; 8.0 percent for 2009 through 2011; 7.5 percent for 2012 through 2016; 7.25 percent for 2017 through 2019; and 7.125 percent effective starting in 2020). This smoothing method recognizes 20 percent of the 2019 asset gain of $3.1 billion this year, with the remainder to be recognized over the next four years.

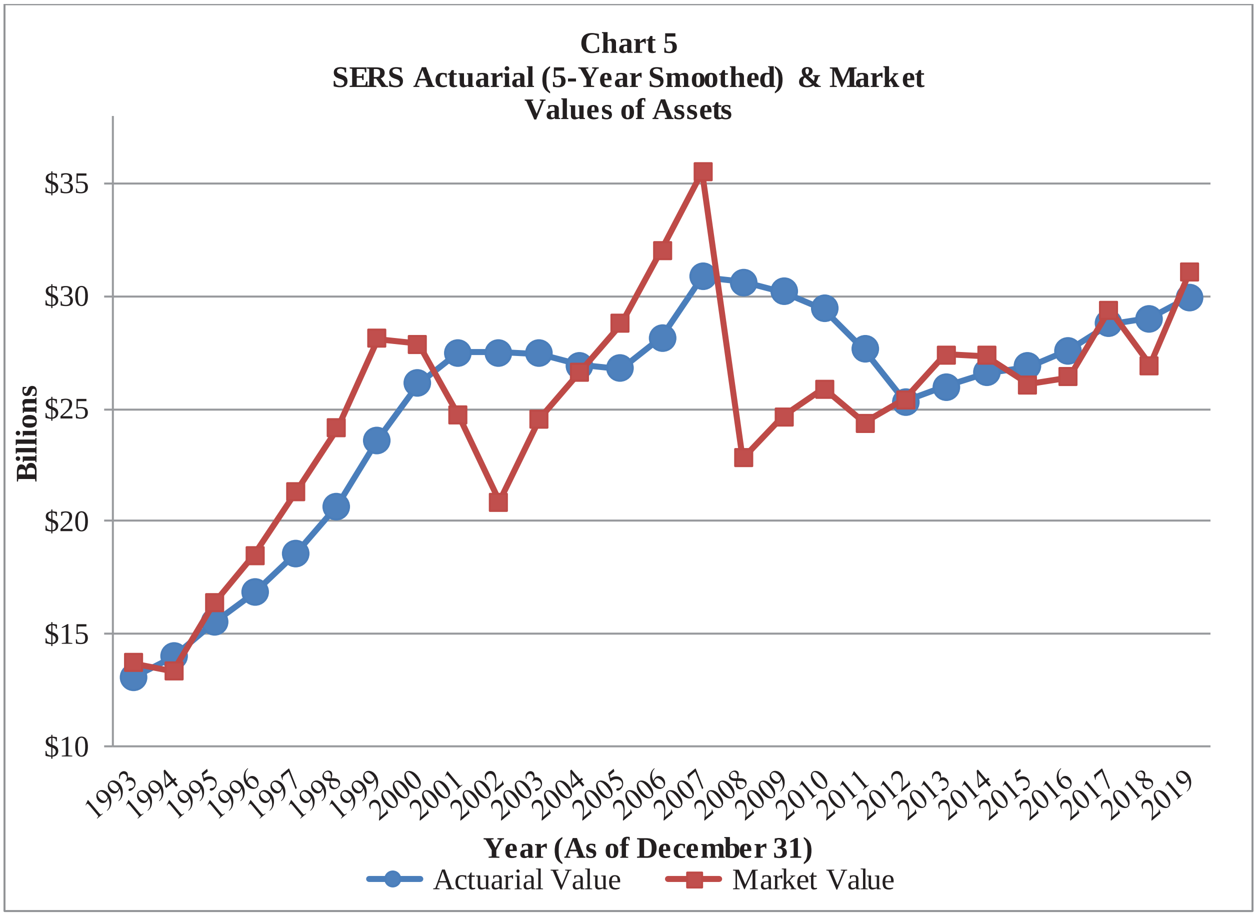


Chart 5 above presents a history since 1993 of SERS asset values, including both the actuarial value and the market value.

Projection

Schedule K shows the number of participants, contributions, and benefits from 2001 through 2019 with a projection through 2030. The first page of Schedule K shows new annuitants, annuitant deaths, new beneficiaries, and beneficiary deaths during the year. The second page of Schedule K shows a projection of post-2019 active participants distributed among the plan options that exist under Act 2017-5 and reflects our expectation that, out of all non-exempt new hires after 2019, approximately 91% will elect Class A-5, 4% will elect Class A-6 and 5% will elect defined contribution (DC) only. This 91%/4%/5% expectation is similar to, but does not exactly reflect, SERS' actual election experience to date. In future valuations, these election percentages will be adjusted to reflect actual election experience. The third page of Schedule K shows the projection of employer and employee contributions and a projection of the benefits and expenses. The projected employee and employer contributions are shown in dollars and as a percentage of compensation. Although Act 2017-5 introduced DC plan options effective in 2019, Schedule K (Page 3 of 3) only includes projected defined benefit (DB) plan contributions.

Note: With Act 2017-5 having become effective at the beginning of 2019, eligible employees (other than exempt Hazardous Duty and State Police) hired on or after January 1, 2019 must opt to join one of the two new hybrid DB/DC plans or the DC Only plan. Therefore, the second page of Schedule K is included to show projected counts of post-2019 active participants among the available plan options.

Risk Measurements

Schedule L provides information on the major risks that could affect the future funded position and contribution needs of SERS. Schedule L includes a discussion of the potential for deviations in future measurements and the estimated effect on the annual employer contribution, also referred to as the Actuarially Determined Contribution (ADC).

This information is intended to enhance the reader's understanding of the potential for future deviations in funded position and contribution needs, and how the risk exposure is changing over time. Schedule L, along with further analyses being completed for the SERS Board and staff, are responsive to the requirements of Actuarial Standard of Practice Number 51 (ASOP 51), which provides guidance on the assessment and disclosure of risk associated with retirement systems.

Participant Data

Sections I and II of Schedule M provide a distribution of the total of the active, inactive, and terminated vested participants as of December 31, 2019 by benefit class, sex, age, and length of service. Inactive participants include employees on furlough as well as employees with prior SERS service currently participating in the Pennsylvania Public School Employees' Retirement System (PSERS). The table also shows the average annualized salary in 2019 by age group and sex. Section III of the schedule shows retired annuitants, disabled annuitants, survivors and beneficiaries receiving benefits by age, sex, and benefit amounts.

Although we have made tests to check for reasonableness and consistency, we have not independently audited the data, which were submitted by SERS. As appropriate, we have made certain adjustments to the SERS data, including the use of a minimum annual salary assumption of $20,000.

Section III of Schedule M shows the monthly annuities that were being paid as of December 31, 2019. Total benefits from the fund include lump sum payments and death benefits so these are much higher than the sum of annuities shown in Schedule M and in the highlights.

Plan Provisions

Schedule N contains a summary of the principal provisions of the plan. As a consequence of Act 2017-5 (signed into law in June 2017 and generally effective January 1, 2019), significant changes in plan provisions, including the addition of three new plan membership classes, have been included effective with the 2018 valuation.

Actuarial Assumptions

Schedule O summarizes the actuarial assumptions used for the valuation. The two types of assumptions are economic assumptions, such as the investment return and salary growth assumptions, and demographic assumptions, such as the assumed rates of retirement and mortality.

As a result of the 2011-2015 actuarial experience study, effective with the December 31, 2015 actuarial valuation, changes were made to most of the actuarial assumptions used for the annual SERS actuarial valuations. With limited exceptions, the actuarial assumptions used for this December 31, 2019 actuarial valuation are the same as those used for the December 31, 2015 valuation.

As a result of the review undertaken during June of 2019, the Board approved a reduction in the annual investment return assumption from 7.25% to 7.125%. The change was implemented with the December 31, 2019 actuarial valuation.

Actuarial Methods

Schedule P explains the asset valuation and funding method used in the valuation, and the determination of the annual contribution. The asset valuation method spreads investment gains and losses over five years. The funding method provides for reasonable levels of contributions that will fund the cost of future benefits with a credit for amortization of the excess of assets over liabilities. Schedule P also explains how the individual class rates are determined. The final section of Schedule P discusses the plan provisions that are not valued.

Glossary

Schedule Q defines certain terms used in this actuarial report.

State Employees' Retirement System
Unfunded Liability and Normal Cost as of December 31, 2019

I.	Present Value of Benefits:			
	A) Active and Inactive Participants			
		1) Superannuation and Withdrawal	$	27,386,294,187
		2) Disability		943,382,930
		3) Death		887,933,670
		4) Refunds		74,161,038
		5) Special Police and Enforcement Officer Benefits		-
		6) Subtotal	$	29,291,771,825
	B) Annuitants and Beneficiaries			29,651,542,459
	C) Total		$	58,943,314,284
II.	Present Value of Member and Employer Contributions:			
	A) Employer Portion of Normal Cost		$	1,140,175,343
	B) Member Contributions			4,055,157,687
	C) Administrative Expenses			(250,942,612)
	D) Fiscal Year Amortization Payable			1,026,348,597
	E) Total		$	5,970,739,015
III.	Actuarial Accrued Liability: (I) - (II)		$	52,972,575,269
IV.	Actuarial Value of Assets		$	29,934,023,548
V.	Unfunded Liability (III) - (IV)		$	23,038,551,721
VI.	Employer Normal Cost Rate			
	A) Total Normal Cost Rate for new active members to fund:			
		1) Superannuation and Withdrawal		5.47%
		2) Disability		0.57%
		3) Death		0.30%
		4) Refunds		0.28%
		5) Total		6.62%
	B) Member Contribution Rate			4.95%
	C) Employer Normal Cost Rate (A) - (B)			1.67%

State Employees' Retirement System
Employer Contribution Rate in Fiscal Year 2020 - 2021

	Funding Period Initial Years	From July 1	Initial Amount of Liability	Outstanding Balance as of 12/31/19	Annual Payment Amount	Payment as a Percent of Compensation*
I. Amortization of Liability (Asset) For:						
A) Liability Fresh Start	30	2010	$5,592,323,524	$4,826,700,245	$460,042,154	6.91%
B) Changes in 2010	30	2011	4,192,690,873	3,693,377,105	344,289,649	5.17%
C) Changes in 2011	30	2012	5,018,078,343	4,503,392,427	411,361,955	6.18%
D) Changes in 2012	30	2013	3,244,242,829	2,963,642,554	265,729,005	3.99%
E) Changes in 2013	30	2014	344,271,135	319,643,988	28,175,934	0.42%
F) Changes in 2014	30	2015	482,239,376	454,454,731	39,437,133	0.59%
G) Changes in 2015	30	2016	1,522,849,789	1,454,832,324	124,444,938	1.87%
H) Changes in 2016	30	2017	740,369,408	716,223,694	60,458,640	0.91%
I) Changes in 2017	30	2018	46,940,886	45,956,399	3,832,232	0.06%
J) Changes in 2018	30	2019	3,460,285,687	3,425,268,914	282,427,574	4.24%
K) Changes in 2019	30	2020	635,059,340	635,059,340	51,821,271	0.78%
Total				**$ 23,038,551,721**	**$ 2,072,020,485**	**31.12%**
II. Employer Normal Cost						**1.67%**
III. Extra Contribution to Return Act 5 Savings						**0.66%**
IV. Total Employer Cost = (I) + (II) + (III)						**33.45%**

* The payment is expressed as a percentage of the total projected covered compensation for active members in fiscal year 2020-2021 of $6,657,541,000. Percentages may not add due to rounding.

State Employees' Retirement System

Employer Contribution Rate by Group
(excluding Benefits Completion Plan rate)

Employer Group (1)	Base Contribution Rate (2)	Age 50 or 55 Retirement Adjustment (3)	Multiplier Adjustment* (4)	Adjustment** (5)	Adjusted Contribution Rate** (6)	Projected 2020-2021 Compensation (7)	Employer Contribution Amount (8)
Class A-5 - Age 67 Retirement	19.56%		1.0000	-2.25%	17.31%	$ 474,726,000	$ 82,175,071
Class A-6 - Age 67 Retirement	19.56%		1.0000	-2.00%	17.56%	22,543,000	3,958,551
DC Plan Only Members	19.56%		1.0000	-3.50%	16.06%	27,025,000	4,340,215
Class A-3 and A-4 - Age 65 Retirement	19.56%		1.3004		25.44%	1,432,108,000	364,328,275
Class AA - Age 60 Retirement	19.56%		1.8819		36.81%	2,776,961,000	1,022,199,344
Class A - Age 60 Retirement	19.56%		1.5055		29.45%	26,419,000	7,780,396
Class A-3 and A-4 - Age 55 Retirement	19.56%	1.72%	1.3004		27.67%	483,177,000	133,695,076
Class AA - Age 50 Retirement (Including Enforcement Officers)	19.56%	1.72%	1.8819		40.05%	780,026,000	312,400,413
Class A - Age 50 Retirement (Including Enforcement Officers)	19.56%	1.72%	1.5055		32.04%	12,604,000	4,038,322
Class A-3 and A-4 - Park Rangers & Capitol Police	19.56%	1.38%	1.3004	0.52%	27.74%	7,754,000	2,150,960
Class AA - Park Rangers & Capitol Police	19.56%	1.38%	1.8819	0.52%	39.92%	8,520,000	3,401,184
Class A - Park Rangers & Capitol Police	19.56%	1.38%	1.5055	0.52%	32.04%	164,000	52,546
Class A-3 and A-4 - State Police	19.56%	1.72%	1.9147	3.75%	44.49%	175,600,000	78,124,440
State Police - Other	19.56%	1.72%	2.1444	3.75%	49.38%	283,902,000	140,190,808
Class D4	19.56%	1.72%	2.2583		48.06%	7,806,000	3,751,564
Class E	19.56%		2.3858		46.67%	138,206,000	64,500,740
					Total***	$6,657,541,000	$2,227,087,902

* The multiplier adjustment is the adjustment for the employer group contribution rate. Because the majority of new active members of SERS beginning in 2019 are covered under Class A-5 (67) or A-6 (67), the blended accrual rate for those Classes is used to determine the base contribution rate. Column (4) is the applicable adjustment factor relative to the Class A-5/A-6 benefit value.

** The adjusted contribution rate is [(2) + (3)] times (4) + (5), where (5) is adjustment (i) for employer contribution to DC Plan for Act 5 classes and (ii) for past liability for other classes.

*** The total employer contribution ($2,227,087,902) is approximately equal to the average employer contribution rate from Schedule B (33.45 percent) times the total projected covered compensation of $6,657,541,000. The base contribution rate of 19.56 percent was determined as the percentage needed to produce employer contribution amounts by employer group that sum to $2,227,087,902.

NOTE: See Schedule P, Section IV for further discussion of this schedule.

State Employees' Retirement System
Development of Shared-Risk Member Contributions

	Calendar Year	Actual Return	Expected Return	Expected Minus Actual
Shared-Risk Basis As of: July 1, 2014	2011	2.7%	8.0%	5.3%
	2012	12.0%	7.5%	-4.5%
	2013	13.6%	7.5%	-6.1%
	2011-2013	9.3%/year**	7.7%/year*	-1.6%
Shared-Risk Basis As of: July 1, 2017	2014	6.4%	7.5%	1.1%
	2015	0.4%	7.5%	7.1%
	2016	6.5%	7.5%	1.0%
	2011-2016	6.8%/year****	7.6%/year***	0.8%
Shared-Risk Basis As of: July 1, 2020	2017	15.1%	7.25%	-7.85%
	2018	-4.6%	7.25%	11.85%
	2019	18.8%	7.25%	-11.55%
	2011-2019	7.6%/year##	7.5%/year#	-0.1%

1)	Shared Rate for Class A-3 and Class A-4 Members as of June 30, 2014:	0.0%
2)	Calculation of 3-Year Annualized Returns for 2011-2013:	
	a) *Expected: $[(1+0.08) \times (1+0.075) \times (1+0.075)]^{(1/3)} - 1$	7.7%
	b) **Actual: $[(1+0.027) \times (1+0.120) \times (1+0.136)]^{(1/3)} - 1$	9.3%
	c) = a) - b)	-1.6%
3)	<u>Adjustment to Shared Rate Based on Initial 3-Year Period (2011-2013)</u>	
	Since 2c) is not greater than 1.0%, Adjustment to Shared Rate = 0%	0.0%
4)	New Shared Rate Effective July 1, 2014 = (1) + (3):	0.0%
5)	Calculation of 6-Year Annualized Returns for 2011-2016:	
	a) ***Expected: $[(1+0.08) \times (1+0.075)^5]^{(1/6)} - 1$	7.6%
	b) ****Actual: $[(1+0.027) \times (1+ 0.120) \times (1+0.136) \times (1+0.064) \times (1+0.004) \times (1+0.065)]^{(1/6)} - 1$	6.8%
	c) = a) - b)	0.8%
6)	<u>Adjustment to Shared Rate Based on 6-Year Period (2011-2016)</u>	
	Since 5c) is not greater than 1.0%, Adjustment to Shared Rate = 0.0%	0.0%
7)	New Shared Rate Effective July 1, 2017 = (4) + (6):	0.0%
8)	Calculation of 9-Year Annualized Returns for 2011-2019:	
	a) #Expected: $[(1+0.08) \times (1+0.075)^5 \times (1+0.0725)^3]^{(1/9)} - 1$	7.5%
	b) ##Actual: $[(1+0.027) \times (1+ 0.120) \times (1+0.136) \times (1+0.064) \times (1+0.004) \times (1+0.065) \times (1+0.151) \times (1-0.046) \times (1+0.188)]^{(1/9)} - 1$	7.6%
	c) = a) - b)	-0.1%
9)	<u>Adjustment to Shared Rate Based on 9-Year Period (2011-2019)</u>	
	Since 8c) is not greater than 1.0%, Adjustment to Shared Rate = 0.0%	0.0%
10)	New Shared Rate Effective July 1, 2020 = (7) + (9):	0.0%

<u>See Notes on Next Page for More on Above Calculations and Future Shared-Risk/Gain Measurements.</u>

Note: The actual investment returns shown above are rounded to the nearest tenth of a percent. The actual calculations may reflect greater precision.

NOTE 1: Shared Rate Effective July 1, 2014

Under the Shared-Risk provision of Act 2010-120, higher member contribution rates could have become effective in 2014 and/or in 2017 and/or in 2020 if SERS investments had underperformed. The first potential Shared-Risk Contribution Rate (Shared Rate) was determined based upon the actual SERS investment returns earned during the three calendar year period ended December 31, 2013. The 2011 to 2013 return information and Shared Rate calculations shown above (in Steps 2-4) support the conclusion that no Shared Rate was applicable for the fiscal year beginning July 1, 2014. That is, since the expected annual return over the three-year period 2011-2013 (7.7%) was not more than 1.0% greater than the actual annual return (9.3%), the Shared Rate did not increase from 0.0% to 0.5%. Thus, no Shared Rate became effective July 1, 2014, and a 0.0% Shared Rate applied through June 30, 2017.

NOTE 2: Shared Rate Effective July 1, 2017

As of December 31, 2016, the second potential adjustment to the Shared Rate was determined based upon the actual SERS investment returns earned during the six calendar years 2011 through 2016. The 2011 to 2016 return information and Shared Rate calculations shown above (in Steps 5-7) support the conclusion that no Shared Rate was applicable for the fiscal year beginning July 1, 2017. That is, since the expected annual return over the six-year period 2011-2016 (7.6%) was not more than 1.0% greater than the actual annual return (6.8%), the Shared Rate did not increase from 0.0% to 0.5%. Thus, no Shared Rate became effective July 1, 2017, and a 0.0% Shared Rate applied through June 30, 2020.

NOTE 3: Shared Rate Effective July 1, 2020

As of December 31, 2019, the third potential Shared Rate adjustment was measured based upon the returns over the 9 calendar years 2011 through 2019. The 2011 to 2019 return information and Shared Rate calculations shown above (in Steps 8-10) support the conclusion that no Shared Rate will be applicable for the fiscal year beginning July 1, 2020. That is, since the expected annual return over the nine-year period 2011-2019 (7.5%) was not more than 1.0% greater than the actual annual return (7.6%), the Shared Rate did not increase from 0.0% to 0.5%. Thus, no Shared Rate becomes effective July 1, 2020, and a 0.0% Shared Rate will apply through June 30, 2023. For Class A-3 and A-4 members, as of December 31, 2022 and every three years thereafter, the Shared-Risk or Shared-Gain Adjustment (as described below) will be based upon the returns over the preceding ten calendar years.

NOTE 4: Act 2017-5 Introduced Shared-Gain and Extended Risk-Sharing to New Classes A-5 and A-6

Shared-Gain Adjustments: Lower member contribution rates could become effective in the future for Classes A-3, A-4, A-5 or A-6 if SERS investments overperform. The first potential Shared-Gain Adjustment to the member contribution rate will now be determined as follows:

- For Classes A-3 and A-4, based upon the actual SERS investment returns earned during the 10 calendar year period ending December 31, 2022 and
- For Classes A-5 and A-6, based upon the actual SERS investment returns earned during the 3 calendar year period ending December 31, 2022 (where the Shared Rate adjustment would be in increments of 0.75%, not 0.5% as applicable to Classes A-3 and A-4).

Applicability: Under Act 2017-5, Classes A-5 and A-6 (like Classes A-3 and A-4) will now potentially experience Shared-Risk or Shared-Gain Adjustments to their future member contribution rates. For Classes A-3, A-4, A-5 and A-6, such adjustment could become effective as soon as July 1, 2023.

In no case will the Shared-Risk/Gain Adjustment be greater than (i) 2.0% for Classes A-3 and A-4 or (ii) 3.0% for Classes A-5 and A-6. Also, should the employer contribution level be below the actuarially required contributions in any fiscal year, the Shared-Risk Contribution Rate will revert to zero.

State Employees' Retirement System
Analysis of the Change in Employer Contribution Rate

		Normal Cost	Unfunded Liability	Total
I.	December 31, 2018 Valuation	1.25%	32.28%	33.53%
II.	Changes in the December 31, 2019 Valuation:			
	A) Change in economic assumption (7.125% interest)	0.14%	0.60%	0.74%
	B) Change in demographics of new entrants	0.28%	-0.23%	0.05%
	C) Loss from investment earnings (net, during 2015-2019)	0.00%	0.13%	0.13%
	D) Other differences between actual and expected experience		-0.09%	-0.09%
	E) Pay increases different than assumptions		0.03%	0.03%
	F) Change in Extra Contribution to Return Act 5 Savings (current year 0.66% minus prior year 0.71%)	0.00%	-0.05%	-0.05%
	G) Change in amortization due to change in payroll	0.00%	-0.89%	-0.89%
	H) Total change	0.42%	-0.50%	-0.08%
III.	December 31, 2019 Valuation: I + II(H)	1.67%	31.78%	33.45%

Analysis of the Change in the Unfunded Liability

I.	December 31, 2018 Unfunded Liability	$ 22,792,597,817
II.	Expected Amortization Payment	2,041,568,777
III.	Expected Unfunded Liability as of December 31, 2019 [(I x 1.0725) - II]	$ 22,403,492,382
IV.	Change in Liability Due to:	
	A) Change in economic assumption (7.125% interest)	$ 749,930,021
	B) Change in demographics of new entrants	(191,167,123)
	C) Loss from investment earnings (net, during 2015-2019)	102,777,869
	D) Other differences between actual and expected experience	(49,495,528)
	E) Pay increases different than assumptions	23,014,100
	F) Total change	635,059,339
V.	December 31, 2019 Unfunded Liability: III + IV(F)	$ 23,038,551,721

State Employees' Retirement System

Actuarial Balance Sheet as of December 31, 2019

ASSETS

Present Assets:	
Members' Savings Account	$ 5,183,195,441
Annuity Reserve Account	26,421,595,675
State Police Benefit Account	3,183,523,707
Enforcement Officers' Benefit Account	46,423,077
State Accumulation Account *	(3,742,073,006)
Supplemental Annuity Account	-
Total Present Assets (Market Value)	$ 31,092,664,894
Adjustment to Smooth Market Fluctuations	(1,158,641,346)
Total Present Assets (Actuarial Value)	$ 29,934,023,548
Present Value of Future Contributions	
Normal Cost Contributions (Employer)	$ 1,140,175,343
Members' Contributions (Employee)	4,055,157,687
Accrued Liability Amortization (Employer)	23,038,551,721
Supplemental Annuity Amortization (Employer)	-
Administrative Expenses	(250,942,612)
Fiscal Year Amortization Payable	1,026,348,597
Total Future Contributions	$ 29,009,290,736
Total Assets	$ 58,943,314,284

* Includes $3,561,011 in directed commissions.

LIABILITIES

Present Value of Benefits Payable to Annuitants and Beneficiaries from:	
Annuity Reserve Account	$ 26,421,595,675
State Police Benefit Account	3,183,523,707
Enforcement Officers' Benefit Account	46,423,077
Total for Annuitants and Beneficiaries	$ 29,651,542,459
Present Value of Benefits to Active and Inactive Members from:	
Members' Savings Account and State Accumulation Account	
Superannuation and withdrawal	$ 27,386,294,187
Disability	943,382,930
Death	887,933,670
Refunds	74,161,038
Subtotal	$ 29,291,771,825
Total Present Value of Benefits to Active and Inactive Members	$ 29,291,771,825
Total Liabilities	$ 58,943,314,284

State Employees' Retirement System
Required Transfers Within SERS Accounts

I. Annuity Reserve Account

Balance as reported by SERS	$	25,835,342,851
Transfer from State Accumulation Account		586,252,824
Transfer to Supplemental Annuity Account		-
December 31, 2019 balance after transfers	$	26,421,595,675

II. State Accumulation Account *

Balance as reported by SERS	$	(3,092,457,155)
Transfer to Enforcement Officers' Benefit Account		(1,326,824)
Transfer to State Police Benefit Account		(62,036,204)
Transfer to Annuity Reserve Account		(586,252,824)
December 31, 2019 balance after transfers	$	(3,742,073,007)

III. Enforcement Officers' Benefit Account

Balance as reported by SERS	$	45,096,253
Transfer from State Accumulation Account		1,326,824
Transfer from Supplemental Annuity Account		-
December 31, 2019 balance after transfers	$	46,423,077

IV. State Police Benefit Account

Balance as reported by SERS	$	3,121,487,503
Transfer from State Accumulation Account		62,036,204
Transfer from Supplemental Annuity Account		-
December 31, 2019 balance after transfers	$	3,183,523,707

V. Supplemental Annuity Account

Balance as reported by SERS	$	-
Transfer from Annuity Reserve Account		-
Transfer to State Police Benefit Account		-
Transfer to Enforcement Officers' Benefit Account		-
December 31, 2019 balance after transfers	$	-

* Balance includes $3,561,011 in directed commissions.

Accounting Disclosure Statements

Introduction

SERS provides retirement benefits to the employees of the Commonwealth of Pennsylvania and is a cost-sharing, multiple-employer defined benefit pension plan. The Governmental Accounting Standards Board (GASB), pursuant to Statement No. 67, *Financial Reporting for Pension Plans*, and Statement No. 68, *Accounting and Financial Reporting for Pensions* (hereafter Statements 67 and 68), addresses accounting and financial reporting for the activities of pension plans, like SERS, that provide pensions to employees of state governmental employers.

It should be noted that:

- Statement 67 recently replaced the requirements of GASB Statement No. 25, *Financial Reporting for Defined Benefit Pension Plans and Note Disclosures for Defined Contribution Plans,* effective for financial statements for fiscal years ending on or after June 30, 2014, and
- Statement 68 recently replaced the requirements of GASB Statement No. 27, *Accounting for Pensions by State and Local Governmental Employers,* effective for fiscal years ending on or after June 30, 2015.

Statement 67 is designed for financial reporting by pension plans and Statement 68 is designed for financial reporting by entities that participate in pension plans. The objective of both statements is to provide more useful, transparent, and comparable financial information related to pensions.

Among the schedules that are no longer required, that had been required disclosures under Statement 25 for many years in the past, are the "Schedule of Funding Progress" and the "Schedule of Employer Contributions." These schedules, both of which have been included in this actuarial report in past years, remain of interest to many readers of this report. Therefore, we have updated these two schedules to reflect the December 31, 2019 actuarial valuation and they are included on the next two pages, for informational purposes. As well, we have included on the pages that follow these schedules, again for informational purposes, our notes and commentary relating to the disclosures formerly required by GASB Statement No. 25.

NOTE: The actuarial information required under Statements No. 67 and 68 is not included in this report. Rather, these actuarial results are provided separately to SERS for inclusion in their annual financial reporting to the public and to the participating employers of the system.

State Employees' Retirement System
Accounting Disclosure Statements (continued)

I. Schedule of Funding Progress as of December 31, 2019

(Dollars in Thousands)

Note: This table is included in this report **FOR INFORMATIONAL PURPOSES**; it is no longer a required disclosure under GASB.

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded Actuarial Accrued Liability (UAAL) (b-a)	Funded Ratio (a) / (b)	Funding Payroll (c)	Unfunded Actuarial Accrued Liability as a Percentage of Funding Payroll ((b-a)/c)
12/31/2000*	26,094,306	19,702,278	(6,392,028)	132.4%	4,769,180	-134.0%
12/31/2001	27,505,494	23,658,757	(3,846,737)	116.3%	4,872,375	-78.9%
12/31/2002	27,497,464	25,285,589	(2,211,875)	108.7%	5,093,454	-43.4%
12/31/2003	27,465,615	26,179,761	(1,285,854)	104.9%	4,965,360	-25.9%
12/31/2004	26,900,027	27,999,026	1,099,000	96.1%	5,093,573	21.6%
12/31/2005*	26,793,782	28,851,716	2,057,934	92.9%	5,138,377	40.1%
12/31/2006	28,148,834	30,364,997	2,216,163	92.7%	5,661,675	39.1%
12/31/2007	30,839,877	31,753,971	914,093	97.1%	5,529,069	16.5%
12/31/2008**	30,635,621	34,437,396	3,801,775	89.0%	5,660,319	67.2%
12/31/2009	30,204,693	35,797,017	5,592,324	84.4%	5,935,988	94.2%
12/31/2010*	29,443,945	39,179,594	9,735,649	75.2%	5,851,704	166.4%
12/31/2011***	27,618,461	42,281,862	14,663,401	65.3%	5,890,704	248.9%
12/31/2012	25,302,688	43,055,564	17,752,876	58.8%	5,836,402	304.2%
12/31/2013	25,975,185	43,874,580	17,899,395	59.2%	5,897,627	303.5%
12/31/2014	26,584,948	44,750,670	18,165,722	59.4%	6,021,688	301.7%
12/31/2015*	26,877,127	46,328,929	19,451,802	58.0%	6,255,189	311.0%
12/31/2016****	27,596,048	47,518,964	19,922,916	58.1%	6,187,427	322.0%
12/31/2017	28,776,939	48,439,403	19,662,465	59.4%	6,265,071	313.8%
12/31/2018	28,989,607	51,782,205	22,792,598	56.0%	6,469,401	352.3%
12/31/2019*****	29,934,024	52,972,575	23,038,552	56.5%	6,657,541	346.1%

* Revised economic and demographic assumptions due to experience review.
** Revised interest rate assumption from 8.5% to 8.0%.
*** Revised interest rate assumption from 8.0% to 7.5%.
**** Revised interest rate assumption from 7.5% to 7.25%.
***** Revised interest rate assumption from 7.25% to 7.125%.

II. Schedule of Employer Contributions as of December 31, 2019

(Dollars in Thousands)

Note:This table is included in this report **FOR INFORMATIONAL PURPOSES**; it is no longer a required disclosure under GASB.

Calendar Year	Annual Required Contribution (ARC)	Actual Contribution	Percentage Contributed
2000	168,002	168,002	100.0%
2001	52,104	76,709	147.2%
2002	22,906	50,831	221.9%
2003	55,079	67,947	123.4%
2004	105,229	105,229	100.0%
2005	319,190	147,163	46.1%
2006	548,745	195,407	35.6%
2007	617,253	242,337	39.3%
2008	584,248	233,138	39.9%
2009	643,861	251,870	39.1%
2010	866,822	272,525	31.4%
2011	913,778	391,189	42.8%
2012	1,044,632	562,883	53.9%
2013	1,314,925	790,996	60.2%
2014	1,407,361	1,081,826	76.9%
2015	1,469,116	1,359,246	92.5%
2016	1,613,626	1,613,626	100.0%
2017	1,883,541	1,883,541	100.0%
2018	2,040,434	2,040,434	100.0%
2019	2,106,138	2,106,138	100.0%

Notes Pertaining to Governmental Accounting Standards Board Statement No. 25 (Although Statement 25 has been replaced by Statement 67, the Statement 25 notes below and on the following pages are provided FOR INFORMATIONAL PURPOSES.)

The actual contribution amounts in the above table include the employer share of regular contributions, the employer share of purchased service and contributions for employee service under the Public School Employees' Retirement System.

The information presented above was determined as part of the actuarial valuations at the dates indicated. Additional information as of the latest actuarial funding valuation follows.

Accounting Disclosure Statements (continued)

Valuation Date	December 31, 2019
Actuarial cost method	Variation of Entry-age Actuarial Cost Method
Amortization method	10-year or 30-year schedule with level payments (on a closed amortization basis)
Remaining amortization period	20 to 30 years (rounded equivalent single amortization period: 23 years)
Asset valuation method	5-year smoothed market
Actuarial Assumptions	
Investment rate of return	7.125 percent
Projected compensation increases	Average increase of 5.6 percent (range: 3.70 to 8.90 percent)
Inflation	2.60 percent
Cost-of-living adjustments	None

The annual employer contribution as set forth in the SERC is equal to the sum of the following:

(1) The employer share of the normal cost.
(2) The fresh start amortization of the December 31, 2009 unfunded liability over a 30-year period beginning July 1, 2010 and ending on June 30, 2040.
(3) The amortization of the change in liability due to Act 2010-120 over a 30-year period beginning July 1, 2011 and ending on June 30, 2041.
(4) The amortization of changes in liability due to actual experience differing from assumed experience after December 31, 2009 over 30-year periods beginning with the July 1 following the actuarial valuation determining such changes.
(5) The extra contribution to return Act 5 savings.

Valuations are performed on December 31 of each year, and the results are presented to the Board as a basis for determining the employer contribution rate for the year beginning July 1 after the valuation date. The Board has adopted the rate from the valuation unless information available after or as part of the valuation supports an adjustment to the valuation rate.

Apart from the statutory funding requirements set forth in the SERC, there are separate accounting standards applicable to SERS. The current reporting requirements of GASB Statements No. 67 and 68 are provided under a separate report.

The former reporting requirements of GASB Statements No. 25 and 27 defined an Annual Required Contribution (ARC) for financial reporting purposes. As long as the statutory annual employer contribution, as defined above, was at least equal to the minimum contribution reported under GASB Statement No. 25, the statutory annual employer contribution was deemed to be the ARC. Whenever the statutory annual employer contribution was less than the minimum contribution reported under GASB, the GASB minimum was deemed to be the ARC.

Accounting Disclosure Statements (continued)

GASB Statement No. 25 defined the ARC to be equal to the employer normal cost plus an amount to amortize the unfunded actuarial accrued liability. The Statement prescribed the maximum acceptable period over which the total unfunded actuarial liability should be amortized. The Statement also required that the "equivalent single amortization period" for all combined amortizations should not exceed the maximum acceptable period. Under the contribution collars from Act 2010-120, the contribution level often resulted in an "equivalent single amortization period" in excess of the maximum acceptable period and thus an actual contribution less than the ARC. In those cases, the ARC was determined using a 30-year amortization period.

During 2001, 2002, and 2003, actual contributions exceeded the ARC. For the period July 1, 2001 through June 30, 2003, the ARC was set at zero. However, contributions were made by employers of some special class members for the cost of additional benefits including payment of past liabilities for retroactive benefit enhancements. Collection of those amounts resulted in the actual contributions exceeding the ARC for all or part of calendar years 2001, 2002 and 2003.

All amortization payments are currently based upon a 30-year schedule of contributions, which remain level during the amortization period. The employer cost is determined as a percent of covered compensation, and the employer contributes that percent of the compensation of all covered members during each fiscal year.

The employer contribution was below the GASB Statement No. 25 minimum from July 1, 2005 through June 30, 2015. However, since July 1, 2015, the actual employer contributions have exceeded the GASB Statement No. 25 minimum.

State Employees' Retirement System

Solvency Test

Valuation Date	Actuarial Accrued Liabilities For: (1) Active Participant Contributions	(2) Annuitants and Beneficiaries	(3) Active Participants (Employer Financed Portion)	Total Actuarial Accrued Liability (AAL)	Actuarial Value of Assets	Portion of Accrued Liabilities Covered by Reported Assets (1)	(2)	(3)	Funded Ratio
	(Amounts in Thousands)								
December 31, 1992	$ 1,994,567	$ 4,621,318	$ 4,872,529	$ 11,488,414	$ 11,769,388	100.0 %	100.0 %	100.0 %	102.4 %
December 31, 1993	2,170,593	4,806,907	5,236,236	12,213,736	13,060,613	100.0	100.0	100.0	106.9
December 31, 1994	2,352,731	5,039,221	6,350,104	13,742,056	13,991,485	100.0	100.0	100.0	101.8
December 31, 1995	2,499,485	5,649,454	6,918,265	15,067,205	15,510,309	100.0	100.0	100.0	102.9
December 31, 1996	2,646,630	6,027,333	7,262,653	15,936,616	16,841,069	100.0	100.0	100.0	105.7
December 31, 1997	2,748,177	6,951,411	7,588,825	17,288,413	18,565,136	100.0	100.0	100.0	107.4
December 31, 1998	2,904,232	7,200,000	8,253,666	18,357,899	20,670,711	100.0	100.0	100.0	112.6
December 31, 1999	2,989,489	7,779,993	8,322,358	19,091,840	23,624,267	100.0	100.0	100.0	123.7
December 31, 2000	3,182,776	8,148,876	8,370,626	19,702,278	26,094,306	100.0	100.0	100.0	132.4
December 31, 2001	3,344,107	8,684,734	11,629,915	23,658,757	27,505,494	100.0	100.0	100.0	116.3
December 31, 2002	3,498,672	10,129,669	12,022,048	25,650,389	27,497,464	100.0	100.0	100.0	107.2
December 31, 2003	3,588,664	11,296,520	11,294,578	26,179,761	27,465,615	100.0	100.0	100.0	104.9
December 31, 2004	3,593,576	12,779,570	11,625,880	27,999,026	26,900,027	100.0	100.0	90.5	96.1
December 31, 2005	3,696,477	14,000,196	11,155,043	28,851,716	26,793,782	100.0	100.0	81.6	92.9
December 31, 2006	3,916,841	14,474,525	11,973,631	30,364,997	28,148,834	100.0	100.0	81.5	92.7
December 31, 2007	3,849,293	16,255,843	11,648,835	31,753,971	30,839,877	100.0	100.0	92.2	97.1
December 31, 2008	4,068,036	17,305,971	13,063,389	34,437,396	30,635,621	100.0	100.0	70.9	89.0
December 31, 2009	4,280,680	17,962,741	13,553,596	35,797,017	30,204,693	100.0	100.0	58.7	84.4
December 31, 2010	4,409,444	18,995,355	15,774,795	39,179,594	29,443,945	100.0	100.0	38.3	75.2
December 31, 2011	4,406,306	21,222,075	16,653,481	42,281,862	27,618,461	100.0	100.0	11.9	65.3
December 31, 2012	4,551,507	22,095,052	16,409,005	43,055,564	25,302,688	100.0	93.9	0.0	58.8
December 31, 2013	4,636,219	23,046,717	16,191,644	43,874,580	25,975,185	100.0	92.6	0.0	59.2
December 31, 2014	4,733,833	23,872,658	16,144,179	44,750,670	26,584,948	100.0	91.5	0.0	59.4
December 31, 2015	4,816,121	25,156,125	16,356,683	46,328,929	26,877,127	100.0	87.7	0.0	58.0
December 31, 2016	4,869,229	26,824,306	15,825,429	47,518,964	27,596,048	100.0	84.7	0.0	58.1
December 31, 2017	4,965,765	27,798,045	15,675,593	48,439,403	28,776,939	100.0	85.7	0.0	59.4
December 31, 2018	5,074,760	28,558,283	18,149,162	51,782,205	28,989,607	100.0	83.7	0.0	56.0
December 31, 2019	5,183,195	29,651,542	18,137,838	52,972,575	29,934,024	100.0	83.5	0.0	56.5

State Employees' Retirement System
Actuarial Value of Assets

I.	Development of 12/31/19 Expected Actuarial Value:		
	A) Actuarial Value as of 12/31/18	$	28,989,607,125
	B) Contributions in 2019		2,516,808,077
	C) Benefits and Expenses in 2019		(3,534,470,055)
	D) Investment return at 7.25% to 12/31/19 on (A)		2,101,746,517
	E) Investment return at 7.25% to 12/31/19 on (B) and (C): 7.25% x .5 x ((B) + (C))		(36,890,247)
	F) Expected Actuarial Value as of 12/31/19: (A) + (B) + (C) + (D) + (E)	$	30,036,801,417
II.	Previous Differences Not Yet Amortized:		
	A) Unrecognized amount of 12/31/15 Difference: .2 x ($1,854,494,812)	$	(370,898,962)
	B) Unrecognized amount of 12/31/16 Difference: .4 x ($381,971,221)		(152,788,488)
	C) Unrecognized amount of 12/31/17 Difference: .6 x $2,103,289,334		1,261,973,600
	D) Unrecognized amount of 12/31/18 Difference: .8 x ($3,491,449,868)		(2,793,159,894)
	E) Total	$	(2,054,873,744)
III.	Actuarial Gain or Loss from 2019:		
	A) Market Value of Assets on 12/31/19	$	31,092,664,894
	B) Expected Market Value II(E) + I(F)		27,981,927,673
	C) Gain (loss) from 2019 Investments (A) - (B)	$	3,110,737,221
IV.	Development of Actuarial Value of Assets as of 12/31/19:		
	A) 20% of ($1,854,494,812) (12/31/15 Difference):	$	(370,898,962)
	B) 20% of ($381,971,221) (12/31/16 Difference):		(76,394,244)
	C) 20% of $2,103,289,334 (12/31/17 Difference):		420,657,867
	D) 20% of ($3,491,449,868) (12/31/18 Difference):		(698,289,974)
	E) 20% of $3,110,737,221 (12/31/19 Difference):		622,147,444
	F) Total Difference: (A) + (B) + (C) + (D) + (E)	$	(102,777,869)
	G) Actuarial Value at 12/31/19: I(F) + IV(F)	$	29,934,023,548

Projection of Annuitants, Beneficiaries and Active Participants
Actual Data Through 2019

Calendar Year	New Annuitants During the Year	Annuitant Deaths During the Year	Total Annuitants (End of Year)	New Beneficiaries During the Year	Beneficiary Deaths During the Year	Total Beneficiaries (End of Year)	Total Annuitants and Beneficiaries	Active Participants	Active Participants (DB Only)
2001			80,911			8,306	89,217	109,716	109,716
2002			82,805			8,423	91,228	111,059	111,059
2003			85,808			8,604	94,412	109,018	109,018
2004			89,869			8,858	98,727	108,405	108,405
2005			92,120			9,059	101,179	109,981	109,981
2006			92,879			9,181	102,060	110,972	110,972
2007			97,657			9,473	107,130	109,610	109,610
2008			98,492			9,654	108,146	110,866	110,866
2009			99,776			9,863	109,639	110,107	110,107
2010			101,701			10,012	111,713	109,255	109,255
2011			105,096			10,246	115,342	107,021	107,021
2012			106,673			10,388	117,061	106,048	106,048
2013			109,356			10,696	120,052	105,186	105,186
2014			111,328			10,921	122,249	104,431	104,431
2015			113,537			11,152	124,689	105,025	105,025
2016			115,867			11,471	127,338	104,632	104,632
2017			117,673			11,800	129,473	102,978	102,978
2018			118,977			12,030	131,007	103,007	103,007
2019			120,367			12,364	132,731	103,100	102,850
2020	5,238	3,629	121,976	726	579	12,511	134,487	103,100	102,562
2021	5,065	3,706	123,335	741	629	12,623	135,958	103,100	102,308
2022	4,971	3,765	124,541	753	672	12,704	137,245	103,100	102,075
2023	4,882	3,833	125,590	767	709	12,762	138,352	103,100	101,859
2024	4,730	3,913	126,407	783	747	12,798	139,205	103,100	101,656
2025	4,525	3,992	126,940	798	778	12,818	139,758	103,100	101,468
2026	4,278	4,031	127,187	806	803	12,821	140,008	103,100	101,294
2027	4,097	4,085	127,199	817	821	12,817	140,016	103,100	101,130
2028	3,882	4,147	126,934	829	837	12,809	139,743	103,100	100,977
2029	3,696	4,237	126,393	847	862	12,794	139,187	103,100	100,834
2030	3,545	4,323	125,615	865	881	12,778	138,393	103,100	100,699

The retirement projections in Schedule K are based upon the current retirement assumptions used for the valuation.

State Employees' Retirement System
Projection of Population

Projection of Active Participants

End of Calendar Year	Pre-Act 2017-5 Total	Hybrid DB/DC Class A-5	Hybrid DB/DC Class A-6	Defined Contribution Only	Act 2017-5 Total	Total DB/DC Active Participants	Total DB Active Participants
2018	103,007	-	-	-	-	103,007	103,007
2019	96,286	6,292	272	250	6,814	103,100	102,850
2020	90,529	11,531	502	538	12,571	103,100	102,562
2021	85,447	16,155	706	792	17,653	103,100	102,308
2022	80,790	20,393	892	1,025	22,310	103,100	102,075
2023	76,462	24,332	1,065	1,241	26,638	103,100	101,859
2024	72,405	28,024	1,227	1,444	30,695	103,100	101,656
2025	68,645	31,445	1,378	1,632	34,455	103,100	101,468
2026	65,158	34,618	1,517	1,806	37,942	103,100	101,294
2027	61,887	37,595	1,648	1,970	41,213	103,100	101,130
2028	58,829	40,378	1,770	2,123	44,271	103,100	100,977
2029	55,956	42,992	1,885	2,267	47,144	103,100	100,834
2030	53,269	45,437	1,993	2,401	49,831	103,100	100,699

Pre-Act 2017-5 totals include exempt Hazardous Duty and State Police

Note: Based upon our preliminary expectations, out of all non-exempt new hires after 2019, approximately 91% will elect Class A-5, 4% will elect Class A-6 and 5% will elect defined contribution (DC) only. While this 91%/4%/5% expectation does not exactly reflect SERS' actual election experience to date, recent trends are more in line with this assumption.

State Employees' Retirement System
Projection of Population, Benefits, and Contributions

Projection of Expected Contributions and Benefits (Defined Benefit Plan Only)
Actual Data Through 2019 (Dollars in Millions)

	Calendar Year Contributions (After 2019, Based Upon Blended Fiscal Projections)		Defined Benefit Plan Contributions as a Percent of Pay: Calendar Year Contributions (Employer Rates Based Upon Blended Fiscal Projections)		Actual Projected Employer Rate	
Year	Employee	Employer	Employee	Employer	(Fiscal Year Beginning July 1)	Calendar Year Benefits and Expenses
2001	$ 240	$ 77				$ 1,266
2002	304	51				1,450
2003	308	68				1,656
2004	302	106				1,880
2005	306	147				1,966
2006	317	196				1,943
2007	334	242				2,361
2008	337	233				2,231
2009	349	252				2,297
2010	349	273				2,473
2011	351	391				2,730
2012	348	563				2,690
2013	352	791				2,862
2014	366	1,082				2,967
2015	372	1,359				3,101
2016	375	1,622				3,249
2017	383	1,897				3,327
2018	394	2,047				3,421
2019	405	2,112				3,533
2020	414	2,198	6.3%	33.5%	33.5%	3,666
2021	423	2,219	6.3%	32.9%	32.3%	3,801
2022	432	2,279	6.2%	32.8%	33.3%	3,939
2023	441	2,352	6.2%	32.9%	32.4%	4,077
2024	451	2,328	6.1%	31.6%	30.8%	4,211
2025	460	2,300	6.1%	30.4%	29.9%	4,339
2026	470	2,299	6.0%	29.5%	29.1%	4,457
2027	480	2,300	6.0%	28.7%	28.3%	4,576
2028	490	2,301	5.9%	27.9%	27.5%	4,689
2029	501	2,304	5.9%	27.1%	26.8%	4,799
2030	511	2,307	5.9%	26.4%	26.1%	4,857

This projection is based upon these assumptions: a projected investment return of 7.125 percent in 2020 and after; general pay increases of 2.90 percent; no future retirement benefit COLAs.

Risk Measurements

Risk of Differences in Future Measurements

The liabilities and costs in this report are based upon actuarial assumptions adopted by the State Employees' Retirement Board (the Board) and funding procedures specified in the SERC. These measurements represent a single estimate of the future assets, liabilities and contribution needs of SERS. Since the actual future contribution needs will be determined by the actual future investment and participant experience, there is a risk that future measurements will differ from those presented in this report due to:

(a) differences in the actual experience of SERS compared to the assumptions used in the measurements, and

(b) changes in the assumptions and methods used for the measurements.

With each measurement, it is important to understand both the current estimate (baseline scenario) and how future estimates may be affected by alternative scenarios. On a regular basis, especially when actuarial valuation assumptions are being reviewed, analyses of specific alternative scenarios are performed and presented to the SERS Board and staff to assist them in understanding the impact of (a) experience that deviates from what is currently actuarially assumed and (b) alternative actuarial assumptions. Such analyses are not included within this report, however, since the alternative scenarios do not represent the expectations used within the valuation.

This schedule provides information that is intended to enhance the reader's understanding of (i) the potential for deviations in SERS' future contribution needs and (ii) SERS' risk exposure and how it changes over time. This information is responsive to the requirements of Actuarial Standard of Practice Number 51 (ASOP 51), which provides guidance on the assessment and disclosure of risk associated with retirement systems.

Major sources of risk that contribute to deviations in future measurements include:

(i) fund investment performance and expectations (which impact future asset levels)
(ii) participant longevity and life expectancy (which impact future liability levels)
(iii) participant compensation patterns throughout career (which impact future liability levels)
(iv) participant retirement and termination patterns (which impact future liability levels)

These factors, and others not listed here, can contribute to changes in SERS' assets, liabilities and funding payroll, which, in turn, directly impact SERS' future contribution needs.

Plan Maturity and the Effect on Contribution Needs

Over time, SERS' assets and liabilities have grown relative to the employer contribution base (i.e., active member funding payroll). This natural growth is referred to as "plan maturity", and it can affect the plan's sensitivity to the various risks described above. A simple metric to understand plan maturity is the ratio of retired members to active members. More mature plans have a higher ratio of retired members to active members.

Risk Measurements (continued)

As the number of retired members per active member grows, the plan accumulates additional assets and liabilities without increasing the contribution base (i.e., the addition of retired members does not increase the active member funding payroll). This is illustrated by comparing the plan's assets to the funding payroll and by comparing the plan's liabilities to the funding payroll. More mature plans generally have a higher ratio of assets to payroll, and more mature plans generally have a higher ratio of liabilities to payroll.

In general, deviations in plan experience or expectations will have a larger effect on the contribution needs of a more mature plan than a less mature plan. That is, the more mature the plan, the greater the plan's sensitivity to risk. For example, an unfavorable asset return that results in the Actuarial Value of Assets being 1 percent lower than expected would have a larger effect on the employer contribution for a more mature plan than for a less mature plan.

Table 1 below provides historical measurements of plan maturity and the potential effects of changes in assets and liabilities on the employers' Actuarially Determined Contributions (ADC).

Table 1 - Plan Maturity Measures
(Dollars in Millions)

Date of Valuation (December 31) (1)	Ratio of Total # Retirees to Total # Active Members (2)	Ratio of Assets to Funding Payroll (3)	First Year Effect on ADC of a 1 Percent Change in Assets (4)	Ratio of Actuarial Accrued Liability to Funding Payroll (5)	First Year Effect on ADC of a 1 Percent Change in Liabilities (6)
2008	1.0	5.5	$27.2	6.2	$30.6
2009	1.0	5.3	$26.8	6.3	$31.8
2010	1.0	5.0	$26.2	6.6	$34.8
2011	1.1	4.7	$23.4	7.2	$35.8
2012	1.1	4.3	$21.4	7.3	$36.5
2013	1.1	4.5	$22.0	7.5	$37.1
2014	1.2	4.5	$22.5	7.6	$37.9
2015	1.2	4.5	$22.8	7.7	$39.2
2016	1.2	4.4	$22.8	7.6	$39.3
2017	1.3	4.7	$23.8	7.8	$40.0
2018	1.3	4.6	$24.0	8.3	$42.8
2019	1.3	4.6	$24.4	8.2	$43.2

As a plan matures, the ratios provided in Columns (2), (3) and (5) above increase; however, as can be seen above, other factors can, and do, sometimes interrupt that upward trend.

Column (2) Ratio - Retirees to Actives: SERS currently has about **1.3** (132,731/102,850) retirees per active member. This ratio has increased historically, and that is expected to continue. The likelihood of large changes in the ADC increases as the number of retirees increases.

Risk Measurements (continued)

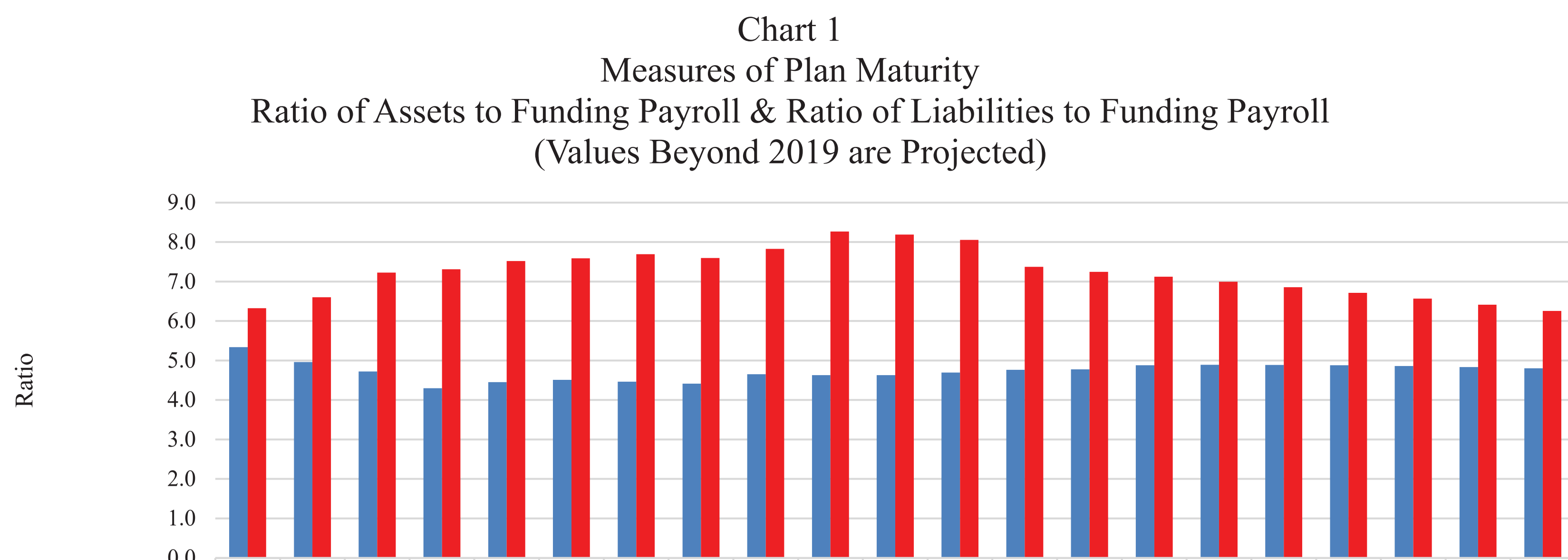
Column (3) Ratio – Actuarial Value of Assets to Funding Payroll: Assets are currently about **4.6** times funding payroll. Although this ratio decreased after the 2008 market downturn, it is expected to gradually rise as the plan matures. The effect of changes in assets on the Actuarially Determined Contribution (ADC) increases as this ratio increases.

Column (5) Ratio – Actuarial Accrued Liability to Funding Payroll: Accrued Liability is currently **8.2** times funding payroll. This ratio has increased significantly in recent years as the actuarial assumptions have been revised. The effect of changes in liabilities on the ADC increases as this ratio increases.

Columns (4) and (6) – Effect on ADC of 1 Percent Change in Assets or 1 Percent Change in Liabilities: These metrics illustrate the potential net effect that the various sources of risk (including the four major risks identified previously and others) would have had on the level of SERS' annual ADC.

As a plan matures, the ADC becomes more sensitive to risks. The charts on the following pages provide a graphical representation of the historical and expected future changes in plan maturity and the sensitivity of the ADC to future changes in assets and liabilities. These charts present the measurements for the 10 years prior to the valuation and the projected measurements for the 10 years following the valuation. The projected measurements are based on the results of the current valuation. Future measurements will be affected by future experience and any implemented changes in assumptions or methods.

Risk Measurements (continued)

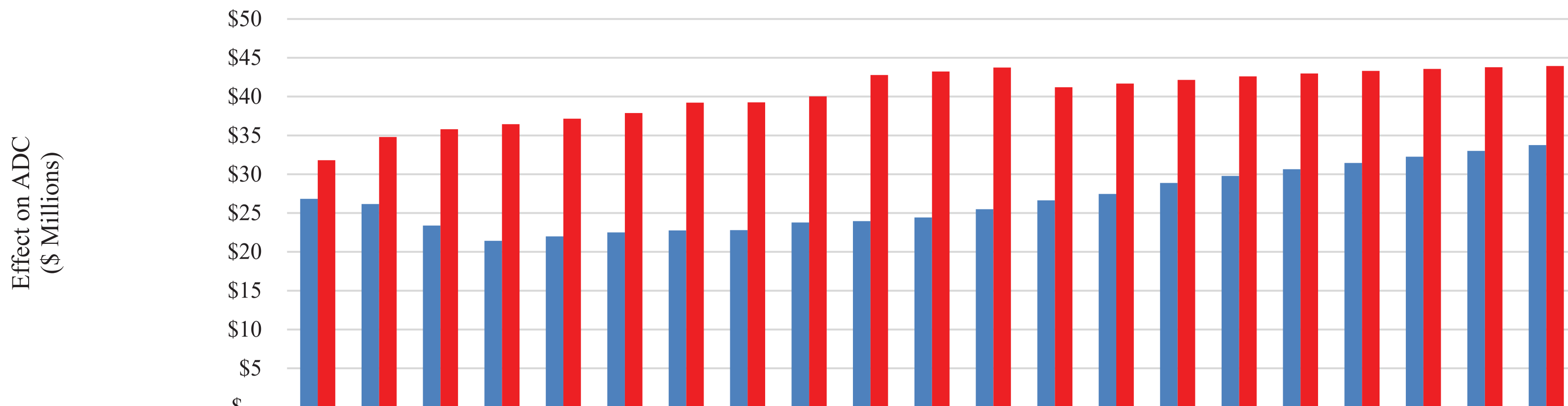


	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Assets/Payroll	5.3	5.0	4.7	4.3	4.5	4.5	4.5	4.4	4.7	4.6	4.6	4.7	4.8	4.8	4.9	4.9	4.9	4.9	4.9	4.8	4.8
Liabilities/Payroll	6.3	6.6	7.2	7.3	7.5	7.6	7.7	7.6	7.8	8.3	8.2	8.1	7.4	7.2	7.1	7.0	6.9	6.7	6.6	6.4	6.3

Chart 1 provides a comparison of SERS assets to the members' funding payroll (Assets/Payroll) and a comparison of SERS actuarial liabilities to the members' funding payroll (Liabilities/Payroll). As of **2019**, SERS assets are **4.6** times payroll and SERS liabilities are **8.2** times payroll. This means that each 1.0 percent change in assets represents 4.6 percent of payroll and each 1.0 percent change in liabilities represents 8.2 percent of payroll. These ratios are expected to gradually decline in future years as more active members are covered by the Act 120 and Act 5 benefit classes, which have a less costly benefit structure, giving rise to lower future contribution rates and, thus, slower growing future plan assets and liabilities.

Risk Measurements (continued)

Chart 2
Effect on Actuarially Determined Contribution (ADC)
of a 1% Change in Assets or Liabilities
($ Millions; Values Beyond 2019 are Projected)



	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
1% Change in Assets	$27	$26	$23	$21	$22	$23	$23	$23	$24	$24	$24	$25	$27	$27	$29	$30	$31	$31	$32	$33	$34
1% Change in Liabilities	$32	$35	$36	$36	$37	$38	$39	$39	$40	$43	$43	$44	$41	$42	$42	$43	$43	$43	$44	$44	$44

Chart 2 provides the estimated effect on the ADC of a 1 percent change in SERS assets and a 1 percent change in SERS actuarial liabilities:

- The effect on the first year ADC (in millions of dollars) of a "1% Change in Assets" is shown in the top row below the graph for the years 2009 through 2029.
- Similarly, the effect on the first year ADC (in millions of dollars) of a "1% Change in Liabilities" is shown in the bottom row below the graph for the years 2009 through 2029.

For example, an unfavorable asset return that would cause the Actuarial Value of Assets to be 1 percent less than expected (i) would increase the ADC by **$27** million if it occurred during **2022** but (ii) would increase the ADC by **$34** million if it occurred in **2029**. A deviation in plan experience that would cause the Actuarial Accrued Liabilities to be 1 percent more than expected (i) would increase the ADC by **$42** million if it occurred in **2022** but (ii) would increase the ADC by **$44** million if it occurred in **2029**. These examples further demonstrate the increasing sensitivity to risk of a maturing plan.

SCHEDULE L
(Page 5 of 5)

State Employees' Retirement System

I. Age, Service and Salary Profile of Active Participants as of December 31, 2019

Active Participants*

Males - Full Years of Service to December 31, 2019

Age Group	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30+	Total	Average Salary
Less than 20	36	0	0	0	0	0	0	36	$ 30,878
20-24	969	7	0	0	0	0	0	976	35,176
25-29	2,127	401	1	0	0	0	0	2,529	42,160
30-34	1,836	1,368	404	7	0	0	0	3,615	50,021
35-39	1,468	1,147	1,214	407	3	0	0	4,239	55,865
40-44	1,254	928	1,030	982	233	4	0	4,431	60,014
45-49	1,141	925	951	957	784	303	13	5,074	63,530
50-54	1,164	846	913	908	765	910	398	5,904	65,267
55-59	1,075	876	929	943	696	745	1,121	6,385	66,327
60-64	727	725	795	775	435	378	565	4,400	64,235
65+	510	470	459	408	187	122	282	2,438	63,758
Total	12,307	7,693	6,696	5,387	3,103	2,462	2,379	40,027	$ 59,832

Average Age 47.46
Average Service 11.44

Females - Full Years of Service to December 31, 2019

Age Group	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30+	Total	Average Salary
Less than 20	35	0	0	0	0	0	0	35	$ 29,336
20-24	883	8	0	0	0	0	0	891	32,967
25-29	2,093	430	15	0	0	0	0	2,538	40,135
30-34	1,995	1,189	389	8	0	0	0	3,581	46,354
35-39	1,706	1,153	1,147	419	18	0	0	4,443	51,349
40-44	1,506	990	1023	940	293	19	0	4,771	54,687
45-49	1,412	935	1,026	881	625	392	42	5,313	56,269
50-54	1,340	960	1,093	917	631	695	543	6,179	57,585
55-59	1,106	873	1,107	1009	684	663	841	6,283	58,221
60-64	685	739	838	847	397	321	386	4,213	55,536
65+	247	332	398	366	172	95	187	1,797	55,198
Total	13,008	7,609	7,036	5,387	2,820	2,185	1,999	40,044	$ 53,468

Average Age 46.99
Average Service 10.88

* The following three pages contain information on members in special categories. These include selected hazardous duty members, legislators, judges and district justices. The above information is for all other active members. Page five of Schedule M is the total of all active categories. Page six is the total of all active participants and inactive and vested participants.

State Employees' Retirement System

I. Age, Service and Salary Profile of Active Participants as of December 31, 2019

Selected Hazardous Duty*

Males - Full Years of Service to December 31, 2019

Age Group	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30+	Total	Average Salary
Less than 20	0	0	0	0	0	0	0	0	$ -
20-24	312	1	0	0	0	0	0	313	46,368
25-29	1,679	229	0	0	0	0	0	1,908	57,790
30-34	1,284	1,131	203	4	0	0	0	2,622	67,484
35-39	625	698	1,077	205	6	0	0	2,611	76,411
40-44	340	345	772	722	242	3	0	2,424	81,864
45-49	273	260	503	693	987	318	7	3,041	88,325
50-54	158	160	349	440	651	494	110	2,362	90,532
55-59	107	105	200	292	237	168	105	1,214	84,880
60-64	47	57	105	151	105	51	40	556	82,338
65+	9	14	62	69	36	17	20	227	83,197
Total	4,834	3,000	3,271	2,576	2,264	1,051	282	17,278	$ 78,123

Average Age 42.00
Average Service 11.58

Females - Full Years of Service to December 31, 2019

Age Group	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30+	Total	Average Salary
Less than 20	0	0	0	0	0	0	0	0	$ -
20-24	90	0	0	0	0	0	0	90	43,412
25-29	448	40	0	0	0	0	0	488	52,329
30-34	375	208	46	1	0	0	0	630	58,839
35-39	249	145	196	30	1	0	0	621	65,496
40-44	179	110	200	144	30	1	0	664	69,758
45-49	153	87	168	133	123	27	1	692	74,225
50-54	89	72	120	95	86	48	6	516	75,806
55-59	65	64	100	75	36	27	15	382	75,504
60-64	26	24	58	49	18	10	6	191	77,367
65+	3	10	18	18	8	5	1	63	78,268
Total	1,677	760	906	545	302	118	29	4,337	$ 67,451

Average Age 42.29
Average Service 9.00

* Enforcement officers, correction officers, psychiatric security aides, and officers of the Pennsylvania State Police and the Delaware River Port Authority

State Employees' Retirement System

I. Age, Service and Salary Profile of Active Participants as of December 31, 2019

Legislators*

Males - Full Years of Service to December 31, 2019

Age Group	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30+	Total	Average Salary
Less than 20	0	0	0	0	0	0	0	0	$ -
20-24	0	0	0	0	0	0	0	0	-
25-29	3	0	0	0	0	0	0	3	90,335
30-34	5	1	0	0	0	0	0	6	90,335
35-39	4	7	3	0	0	0	0	14	92,533
40-44	4	4	2	1	0	0	0	11	92,639
45-49	4	5	3	4	0	0	0	16	92,258
50-54	3	6	7	1	1	1	0	19	91,002
55-59	4	5	4	4	3	4	0	24	96,927
60-64	4	3	8	0	2	3	6	26	95,724
65+	0	3	7	4	2	6	5	27	94,398
Total	31	34	34	14	8	14	11	146	$ 93,812

Average Age 53.98
Average Service 12.96

Females - Full Years of Service to December 31, 2019

Age Group	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30+	Total	Average Salary
Less than 20	0	0	0	0	0	0	0	0	$ -
20-24	0	0	0	0	0	0	0	0	-
25-29	0	0	0	0	0	0	0	0	-
30-34	4	1	0	0	0	0	0	5	90,335
35-39	5	1	0	0	0	0	0	6	93,533
40-44	4	1	0	0	0	0	0	5	90,335
45-49	1	1	1	0	0	0	0	3	90,335
50-54	2	1	1	0	0	1	1	6	92,447
55-59	3	1	2	1	0	2	1	10	91,602
60-64	0	5	0	0	0	0	0	5	94,173
65+	1	2	3	2	1	1	2	12	91,391
Total	20	13	7	3	1	4	4	52	$ 91,804

Average Age 53.19
Average Service 10.23

*Legislators are not required to join the retirement system, therefore the total participant count may not reflect the entire 253-member General Assembly.

State Employees' Retirement System
I. Age, Service and Salary Profile of Active Participants as of December 31, 2019

Judges And Magisterial District Judges

Males - Full Years of Service to December 31, 2019

Age Group	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30+	Total	Average Salary
Less than 20	0	0	0	0	0	0	0	0	$ -
20-24	0	0	0	0	0	0	0	0	-
25-29	0	0	0	0	0	0	0	0	-
30-34	3	0	0	0	0	0	0	3	91,621
35-39	7	2	1	0	0	0	0	10	110,009
40-44	16	9	4	0	1	0	0	30	106,767
45-49	22	12	10	3	1	0	0	48	121,399
50-54	30	31	27	9	9	1	0	107	125,895
55-59	18	27	22	19	9	6	3	104	127,727
60-64	19	24	44	24	22	15	7	155	137,894
65+	11	23	48	37	45	39	22	225	145,009
Total	126	128	156	92	87	61	32	682	$ 133,666

Average Age 59.45
Average Service 13.68

Females - Full Years of Service to December 31, 2019

Age Group	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30+	Total	Average Salary
Less than 20	0	0	0	0	0	0	0	0	$ -
20-24	0	0	0	0	0	0	0	0	-
25-29	0	0	0	0	0	0	0	0	-
30-34	1	0	0	0	0	0	0	1	91,621
35-39	5	3	1	0	0	0	0	9	101,800
40-44	2	2	3	0	0	0	0	7	104,777
45-49	14	8	6	5	2	0	0	35	137,542
50-54	14	16	10	7	6	3	0	56	136,541
55-59	9	5	23	7	5	4	1	54	144,556
60-64	6	7	22	11	16	5	0	67	154,103
65+	3	2	10	9	11	9	11	55	152,265
Total	54	43	75	39	40	21	12	284	$ 143,335

Average Age 57.02
Average Service 13.47

All Active Participants

Males - Full Years of Service to December 31, 2019

Age Group	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30+	Total	Average Salary
Less than 20	36	0	0	0	0	0	0	36	$ 30,878
20-24	1,281	8	0	0	0	0	0	1,289	37,894
25-29	3,809	630	1	0	0	0	0	4,440	48,909
30-34	3,128	2,500	607	11	0	0	0	6,246	57,410
35-39	2,104	1,854	2,295	612	9	0	0	6,874	63,823
40-44	1,614	1,286	1,808	1,705	476	7	0	6,896	67,950
45-49	1,440	1,202	1,467	1,657	1,772	621	20	8,179	73,145
50-54	1,355	1,043	1,296	1,358	1,426	1,406	508	8,392	73,209
55-59	1,204	1,013	1,155	1,258	945	923	1,229	7,727	70,163
60-64	797	809	952	950	564	447	618	5,137	68,576
65+	530	510	576	518	270	184	329	2,917	71,822
Total	17,298	10,855	10,157	8,069	5,462	3,588	2,704	58,133	$ 66,220

Average Age 46.00
Average Service 11.51

Females - Full Years of Service to December 31, 2019

Age Group	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30+	Total	Average Salary
Less than 20	35	0	0	0	0	0	0	35	$ 29,336
20-24	973	8	0	0	0	0	0	981	33,925
25-29	2,541	470	15	0	0	0	0	3,026	42,102
30-34	2,375	1,398	435	9	0	0	0	4,217	48,282
35-39	1,965	1,302	1,344	449	19	0	0	5,079	53,218
40-44	1,691	1,103	1,226	1,084	323	20	0	5,447	56,621
45-49	1,580	1,031	1,201	1,019	750	419	43	6,043	58,813
50-54	1,445	1,049	1,224	1,019	723	747	550	6,757	59,662
55-59	1,183	943	1,232	1,092	725	696	858	6,729	59,945
60-64	717	775	918	907	431	336	392	4,476	57,986
65+	254	346	429	395	192	110	201	1,927	58,948
Total	14,759	8,425	8,024	5,974	3,163	2,328	2,044	44,717	$ 55,439

Average Age 46.61
Average Service 10.71

State Employees' Retirement System
II. Age and Service Profile of Active Participants and Inactive and Vested Participants
As of December 31, 2019

Active Participants and Inactive and Vested Participants

Males - Full Years of Service to December 31, 2019

Age Group	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30+	Total
Less than 20	36	0	0	0	0	0	0	36
20-24	1,283	8	0	0	0	0	0	1,291
25-29	3,812	634	1	0	0	0	0	4,447
30-34	3,140	2,585	619	11	0	0	0	6,355
35-39	2,123	2,087	2,404	622	10	0	0	7,246
40-44	1,634	1,529	1,938	1,749	478	7	0	7,335
45-49	1,470	1,475	1,616	1,719	1,799	626	20	8,725
50-54	1,396	1,252	1,465	1,422	1,479	1,429	513	8,956
55-59	1,251	1,235	1,285	1,320	979	954	1,277	8,301
60-64	831	870	995	991	608	475	670	5,440
65+	627	552	616	542	289	193	342	3,161
Total	17,603	12,227	10,939	8,376	5,642	3,684	2,822	61,293

Average Age 46.23
Average Service 11.46

Females - Full Years of Service to December 31, 2019

Age Group	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30+	Total
Less than 20	35	0	0	0	0	0	0	35
20-24	975	8	0	0	0	0	0	983
25-29	2,550	474	15	0	0	0	0	3,039
30-34	2,392	1,489	451	9	0	0	0	4,341
35-39	1,999	1,566	1,425	454	19	0	0	5,463
40-44	1,725	1,429	1,353	1,123	328	20	0	5,978
45-49	1,638	1,345	1,331	1,074	759	422	43	6,612
50-54	1,520	1,308	1,394	1,091	743	769	561	7,386
55-59	1,277	1,222	1,423	1,149	756	715	886	7,428
60-64	796	891	1,007	946	465	357	415	4,877
65+	339	406	467	418	210	118	209	2,167
Total	15,246	10,138	8,866	6,264	3,280	2,401	2,114	48,309

Average Age 46.90
Average Service 10.59

*The total participant count excludes 250 Class 40 members.

Superannuation Annuitants

	Male		Female		Total	
Age	Number	Annual Annuity	Number	Annual Annuity	Number	Annual Annuity
Under 25	-	$ -	-	$ -	-	$ -
25-29	-	-	-	-	-	-
30-34	-	-	-	-	-	-
35-39	-	-	-	-	-	-
40-44	-	-	-	-	-	-
45-49	-	-	-	-	-	-
50-54	868	42,682,758	120	4,339,797	988	47,022,555
55-59	1,887	86,462,778	805	34,978,354	2,692	121,441,132
60-64	4,459	171,168,843	3,631	126,034,806	8,090	297,203,649
65-69	8,339	268,945,460	6,982	207,586,179	15,321	476,531,639
70-74	9,772	304,111,536	6,109	159,393,212	15,881	463,504,748
75-79	6,026	187,176,098	4,064	91,993,396	10,090	279,169,494
80-84	3,930	112,127,984	2,878	52,636,723	6,808	164,764,707
85-89	2,308	56,423,747	1,954	27,337,575	4,262	83,761,322
90 & over	1,386	28,145,171	1,789	19,971,057	3,175	48,116,228
Total	38,975	$ 1,257,244,375	28,332	$ 724,271,099	67,307	$ 1,981,515,474

Average Age	72.5
Average Annual Annuity	$29,440

Early Retirement Annuitants

	Male		Female		Total	
Age	Number	Annual Annuity	Number	Annual Annuity	Number	Annual Annuity
Under 25	-	$ -	-	$ -	-	$ -
25-29	3	1,636	5	3,129	8	4,765
30-34	132	186,272	152	160,614	284	346,886
35-39	431	926,315	479	681,501	910	1,607,816
40-44	611	1,778,309	662	1,404,471	1,273	3,182,780
45-49	1,043	19,959,519	876	3,486,162	1,919	23,445,681
50-54	2,228	78,399,381	1,197	10,542,918	3,425	88,942,299
55-59	2,274	60,686,549	2,096	31,599,242	4,370	92,285,791
60-64	2,925	71,810,044	3,425	61,583,317	6,350	133,393,361
65-69	3,544	81,455,935	4,797	83,847,577	8,341	165,303,512
70-74	4,799	112,759,396	3,828	62,304,854	8,627	175,064,250
75-79	2,718	55,299,251	1,827	24,584,375	4,545	79,883,626
80-84	1,229	19,365,586	1,135	11,935,256	2,364	31,300,842
85-89	691	10,889,831	731	6,772,692	1,422	17,662,523
90 & over	236	3,380,841	349	2,823,040	585	6,203,881
Total	22,864	$ 516,898,865	21,559	$ 301,729,148	44,423	$ 818,628,013

Average Age	65.5
Average Annual Annuity	$18,428

Disabled Annuitants

	Male		Female		Total	
Age	Number	Annual Annuity	Number	Annual Annuity	Number	Annual Annuity
Under 25	-	$ -	-	$ -	-	$ -
25-29	-	-	2	30,741	2	30,741
30-34	18	279,427	8	99,423	26	378,850
35-39	39	614,356	34	492,800	73	1,107,156
40-44	69	1,200,676	82	1,212,271	151	2,412,947
45-49	199	3,886,322	196	3,096,938	395	6,983,260
50-54	356	7,262,263	322	5,513,757	678	12,776,020
55-59	594	11,779,408	609	10,606,657	1,203	22,386,065
60-64	798	14,998,707	868	14,663,068	1,666	29,661,775
65-69	878	14,893,367	955	14,966,889	1,833	29,860,256
70-74	634	9,604,284	705	9,935,511	1,339	19,539,795
75-79	337	3,908,918	349	3,808,540	686	7,717,458
80-84	132	1,211,229	220	1,994,355	352	3,205,584
85-89	55	535,169	109	857,413	164	1,392,582
90 & over	22	218,719	47	344,780	69	563,499
Total	4,131	$ 70,392,845	4,506	$ 67,623,143	8,637	$ 138,015,988

Average Age	64.5
Average Annual Annuity	$15,980

Beneficiaries and Survivor Annuitants

	Male		Female		Total	
Age	Number	Annual Annuity	Number	Annual Annuity	Number	Annual Annuity
Under 25	13	$ 129,337	22	$ 140,760	35	$ 270,097
25-29	14	106,689	20	168,986	34	275,675
30-34	23	250,271	24	215,330	47	465,601
35-39	12	91,418	28	268,647	40	360,065
40-44	33	338,131	51	445,964	84	784,095
45-49	38	449,984	127	1,453,197	165	1,903,181
50-54	66	543,394	308	4,092,556	374	4,635,950
55-59	75	689,247	504	6,953,526	579	7,642,773
60-64	136	1,344,423	837	11,971,721	973	13,316,144
65-69	220	2,962,879	1,308	20,700,079	1,528	23,662,958
70-74	253	3,435,675	1,732	28,378,975	1,985	31,814,650
75-79	233	2,552,092	1,629	26,438,259	1,862	28,990,351
80-84	153	1,552,084	1,577	22,645,556	1,730	24,197,640
85-89	136	1,308,427	1,364	16,800,447	1,500	18,108,874
90 & over	83	809,748	1,345	13,582,214	1,428	14,391,962
Total	1,488	$ 16,563,799	10,876	$ 154,256,217	12,364	$ 170,820,016

Average Age	74.7
Average Annual Annuity	$13,816

Benefit and Contribution Provisions as of December 31, 2019
(as embodied in Act 31 of 1974, and amended through Act 5 in June 2017)

The State Employees' Retirement System makes provision for retirement, disability, and death benefits for all State employees, except those specifically excluded under Section 5301 of the SERC, and certain other eligible groups. The major provisions are summarized as follows:

Eligible Employees

Class A-5 -	All eligible members hired after December 31, 2018, except exempt groups (State Police and all hazardous duty, et al.).
Class A-6 -	Same as Class A-5 but this class is for members who elect to pay a lower member contribution amount and receive a lower benefit.
DC Only -	Same as Class A-5 but this class is for members who elect to only participate in the Defined Contribution Plan.
Class A-3 -	All eligible employees hired after December 31, 2010 but prior to January 1, 2019, except members of the judiciary. Certain groups have effective dates after December 31, 2010 that are tied to the expiration of collective bargaining agreements. Members of the General Assembly who joined SERS on or after December 1, 2010 are also part of this class. State Police and most hazardous duty hired after December 31, 2018 continue to be eligible.
Class A-4 -	Same as Class A-3 but this class is for members who elect to pay a higher member contribution amount and receive a higher benefit.
Class AA -	All eligible employees hired after June 30, 2001 but prior to January 1, 2011, except State Police Officers, members of the judiciary and legislators, and employees hired before July 1, 2001, who elected Class AA by December 31, 2001.
Class A -	State Police Officers hired on or after March 1, 1974 but prior to July 1, 2012, members of the judiciary who have not elected Class E-1 or E-2, legislators elected and became members before July 1, 2001, who have not elected Class AA or Class D-4 and Class A employees hired before July 1, 2001, who remained in Class A.
Class D-4 -	Legislators coming into service prior to December 1, 2010, who elect to be SERS members, and elected Class D-4.
Class E-1 -	Judges who elect Class E-1.
Class E-2 -	Magisterial District Judges who elect Class E-2.

Benefit and Contribution Provisions as of December 31, 2019 (continued)
(as embodied in Act 31 of 1974, and amended through Act 5 in June 2017)

Age and Service Requirements for Superannuation (full formula benefits)

Class A-5 & Class A-6

General Conditions	Age 67 with three years of credited state service; or a total attained age and years of credited service of 97 (the "Rule of 97") with credited service being at least 35 years.

Class A-3 & Class A-4

General Conditions	Age 65 with three years of credited state service; or a total attained age and years of credited service of 92 (the "Rule of 92") with credited service being at least 35 years.
Legislators and certain correction officers and enforcement officers	Age 55 with three years of credited state service.
Park Rangers & Capitol Police	Age 55 with 20 years of Park Ranger or Capitol Police credited service. If total credited service is less than 20 years, General Conditions apply.
State Police	Age 55. State Police are eligible for special unreduced benefits after 20 years of credited service, regardless of age; however, age 55 remains their superannuation age.

Class AA & Class A

General Conditions	Age 60 with three years of credited state service; or 35 or more years of credited service, regardless of age.
Legislators and certain correction officers and enforcement officers	Age 50 with three years of credited state service.
Park Rangers & Capitol Police	Age 50 with 20 years of Park Ranger or Capitol Police credited service. If total credited service is less than 20 years, General Conditions apply.
State Police	Age 50. State Police are eligible for special unreduced benefits after 20 years of credited service, regardless of age; however, age 50 remains their superannuation age.
Class D-4	Age 50 with three years of credited state service.
Class E-1 & Class E-2	Age 60 with three years of credited state service; or 35 or more years of credited service, regardless of age.

Benefit and Contribution Provisions as of December 31, 2019 (continued)
(as embodied in Act 31 of 1974, and amended through Act 5 in June 2017)

Formula for Superannuation Annuity

The single life annuity applicable to members of Class AA and Class A-4 is equal to 2.5 percent of the high 3-year final average salary (FAS) of the member multiplied by the years and fractions of credited service. The single life annuity applicable to members of Class A and Class A-3 is equal to 2 percent of the high 3-year final average salary of the member multiplied by the years and fractions of credited service. The single life annuity applicable to members of Class A-5 is equal to 1.25 percent of the high 5-year final average salary of the member multiplied by the years and fractions of credited service. The single life annuity applicable to members of Class A-6 is equal to 1 percent of the high 5-year final average salary of the member multiplied by the years and fractions of credited service.

The single life annuity applicable to State Police is 50 percent of the highest full calendar year of compensation, other than the year in which the member retires, if the member has 20 but less than 25 years of service. With more than 25 years of service the benefit is 75 percent of the highest annual salary, other than the year in which the member retires.

The benefit accrual rates for other classes of members are as follows:

Class	Benefit Accrual Rate
D-4	3.0 percent
E-1	4.0 percent for each of the first 10 years of judicial service, dropping to 3.0 percent for each subsequent year of judicial service.
E-2	3.0 percent for each year of judicial service.

Members who have 41 or more years of combined Class A-3, A-4, A and AA service are entitled to a supplemental benefit ranging from 2 percent of the applicable single life annuity for members with 41 years of service to 10 percent of the applicable single life annuity for members with 45 or more years of service.

The benefit for a member who works past age 70 is at least equal to a benefit that is the actuarial equivalent of the prior year's benefit. This determination is made each year after age 70.

In addition to the above benefits, a member who has elected Social Security Integration Coverage is entitled to a single life annuity of 2 percent of the member's "Average Non-Covered Salary" for each year of Social Security Integration (SSI) coverage. All Class E members can elect SSI coverage. Other members must have elected SSI coverage before March, 1974. "Average Non-Covered Salary" is the average annual salary received while covered by the Retirement System since January 1, 1956 in excess of the maximum covered wages under Social Security.

Benefit and Contribution Provisions as of December 31, 2019 (continued)
(as embodied in Act 31 of 1974, and amended through Act 5 in June 2017)

Limitations on Annuity

In almost all cases, SERS benefits are limited to no more than 100 percent of compensation. An exception to this limit is the actuarial increase portion of the benefit for certain members eligible for actuarial increases due to retirement beyond age 70. For such members, the 100 percent of salary limit only applies to the base benefit. Also, the amount of annual retirement benefit a member may receive shall not exceed the dollar limit specified under Section 415(b) of the Internal Revenue Code. Benefits in excess of the 415(b) limit are paid through the Benefits Completion Plan.

Age and Service Requirements for Disability Retirement

A member is eligible for disability retirement, if, as determined by a member of the SERS medical review staff, he or she is unable to perform their current job and has at least 5 years of credited service. An officer of the State Police or an enforcement officer does not have a minimum service requirement.

Formula for Disability Benefit

The disability benefit is equal to the benefit calculated as of superannuation age, based on years of credited service at disability, if the result is greater than or equal to 33-1/3 percent of FAS at time of disability. If the benefit so calculated is less than 33-1/3 percent of FAS, the disability benefit is equal to the smaller of:

(a) the benefit calculated as of superannuation age based on Service projected to retirement date, or

(b) 33-1/3 percent of FAS at time of disability.

For service connected disabilities, the disability benefit payable will be increased, as needed, so that the sum of the plan benefit and the benefits paid or payable under the Workers' Compensation Act, The Pennsylvania Occupational Disease Act, and the Social Security Act equals 70 percent of FAS.

Eligibility for Vested Benefit

All Class A-3, A-4, A-5, and A-6 members have a vested entitlement to an annuity after 10 years of credited service. All other classes are vested after 5 years of credited service.

Vested Benefit

The vested benefit is equal to the benefit calculated using years of credited service at the time of leaving the plan. The former member can receive the full benefit beginning at superannuation age, or an actuarially reduced withdrawal annuity beginning at any date after separation but before superannuation age.

Benefit and Contribution Provisions as of December 31, 2019 (continued)
(as embodied in Act 31 of 1974, and amended through Act 5 in June 2017)

For those not in Classes A-3, A-4, A-5, or A-6, the withdrawal annuity is reduced from the earlier of age 60, or the age at which the member would have 35 years of credited service. Benefits for Park Rangers and Capitol Police who have 20 years of credited service (as Park Rangers and Capitol Police) are reduced from age 50. Benefits for other members who have an age 50 superannuation age are reduced from age 50 irrespective of the amount of credited service they have.

For Classes A-3 and A-4, the withdrawal annuity is reduced from age 65. If prior to age 65 the member has both reached 35 years of credited service and met the conditions of the Rule of 92, then the member is eligible for unreduced benefits. Benefits for Park Rangers and Capitol Police who have 20 years of credited service (as Park Rangers and Capitol Police) are reduced from age 55. Benefits for other members who have an age 55 superannuation age are reduced from age 55 irrespective of the amount of credited service they have. For Classes A-5 and A-6, the withdrawal annuity is reduced from age 67. If prior to age 67 the member has both reached 35 years of credited service and met the conditions of the Rule of 97, then the member is eligible for unreduced benefits.

Eligibility for Death Benefit Prior to Retirement

A member is eligible if the member (1) is under superannuation age with 5 years (or 10 years under Classes A-3, A-4, A-5, and A-6) of credited service or (2) has attained superannuation age with 3 years of credited state service.

Amount of Death Benefit Prior to Retirement

An eligible beneficiary receives the full present value of the benefits to which the member would have been entitled had the member retired the day before he or she died, assuming the member had elected Option 1 if no other option had been elected. This death benefit includes the present value associated with benefits, if any, to which the member may not have been entitled because they exceeded the member's highest consecutive twelve months of salary and are limited by appropriate IRS limitations.

Death Benefits After Retirement

A member who elects the maximum single life annuity is entitled to a refund of the unpaid balance of the accumulated member contributions and interest at the time of retirement. A member may elect one of several optional reduced pensions in lieu of the maximum single life annuity to provide additional death benefit protection. The optional forms of benefit are actuarially equivalent to the maximum single life annuity benefit using 4.0 percent interest per annum, compounded annually, and the actuarial equivalence factors described below.

The beneficiary of a disabled member who did not elect an alternative option receives benefits determined under Maximum Disability. Maximum Disability provides that the beneficiary will receive a benefit equal to the present value of the maximum single life annuity at retirement reduced

Benefit and Contribution Provisions as of December 31, 2019 (continued)
(as embodied in Act 31 of 1974, and amended through Act 5 in June 2017)

by any payments received by the annuitant. The Maximum Disability benefit is provided to a disabled member without any reduction in the member's benefit.

A Supplemental Death Benefit is payable to a beneficiary of a member who had a retirement benefit limited by 100 percent of final compensation. The Supplemental Death Benefit is the present value of the excess of the retirement benefit payable to the member before applying the 100 percent of final compensation limit, over the 100 percent of final compensation limit, subject to limits imposed by IRC Section 401(a)(9). If the benefit payable to the member is larger than the IRC Section 415(b) limit, the part of the Supplemental Death Benefit in excess of the IRC Section 415(b) limit will be payable from the Benefits Completion Plan. The Supplemental Death Benefit payment is in addition to any death benefit that may be paid as a result of the optional election.

The "Extra Piece"

The SERC provides for an "extra piece" to be added to the annual benefit if the member's accumulated deductions exceed one-half of the actuarially equivalent value of the annual benefit. The extra piece is equal to the difference between the total accumulated deductions and one-half of the actuarially equivalent value of the annual benefit. This provision does not apply to Classes A-3, A-4, A-5, and A-6.

Cost-of-Living Allowances (COLAs)

Supplemental annuities applying cost-of-living increases to the benefits of annuitants have been instituted from time to time. The last cost-of-living increase was a two-stage increase under Act 2002-38. The first stage was applicable to annuitants who retired on or before July 1, 1990, and it became effective in July of 2002. The second stage provided cost-of-living increases to annuitants who retired after July 1, 1990, but prior to July 2, 2002, and it became effective in July of 2003.

Rate of Member Contribution

(i) Regular member contributions, excluding Social Security Integration contributions

Class A-5 -	5.00 percent of total compensation
Class A-6 -	4.00 percent
Class A-3 -	6.25 percent
Class A-4 -	9.30 percent
Class AA -	6.25 percent
Class A -	5.00 percent
Class D-4 -	7.50 percent
Class E-1 -	10.00 percent during the first 10 years of judicial service and 7.50 percent thereafter.
Class E-2 -	7.50 percent

Benefit and Contribution Provisions as of December 31, 2019 (continued)
(as embodied in Act 31 of 1974, and amended through Act 5 in June 2017)

(ii) Additional contribution for Social Security Integration Credit

Any member who elects the Social Security Integration Credit pays 5.00 percent of any salary in excess of the amount of salary covered by Social Security during the year for which contributions are being made. A member electing to end additional contributions is ineligible to make future contributions or accrue future benefits.

Interest Credited on Member Contributions

A rate of 4 percent compounded annually, the statutory rate of interest, has been credited on the member contributions since the inception of the system.

Refund of Accumulated Member Contributions

On the death of a member not qualifying for death benefits, the accumulated member contributions and interest will be paid to the beneficiary. Upon application, a member terminating service when not eligible for another form of benefit is paid a refund of the accumulated contributions and interest. Other terminating members may elect to receive a lump sum payment of a portion of the present value of their benefit, not to exceed their accumulated contributions and interest under Option 4 as part of the members' option. Their lump sum payment results in a decrease to the annuity benefit otherwise payable. Under Act 120, Classes A-3 and A-4 were not eligible to receive a lump sum and reduced annuity under Option 4. However, Act 5 added a lump sum feature for Classes A-3, A-4, A-5, and A-6 that provided for cost neutral (based on funding interest assumption) lump sums and reduced annuities under Option 4.

Employer Contributions

The employer pays the balance of the cost in excess of the members' contributions with payment schedules determined by law. Act 2017-5 made changes to the SERS plan design and funding rules which have significantly affected the required employer contributions. See Sections III and IV of Schedule P for the details.

Actuarial Equivalence

The actuarial table used to determine optional and early retirement benefits for members who entered service after August 1983 is the 1983 Group Annuity Mortality (1983 GAM) Unisex table.

Benefit and Contribution Provisions as of December 31, 2019 (continued)
(as embodied in Act 31 of 1974, and amended through Act 5 in June 2017)

Members who entered service before August 1983 receive the better of benefits based on the 1983 GAM table or a variation of the 1971 Group Annuity Mortality (1971 GAM) male table. The 1971 GAM table that applies in determining the benefits for members who entered service before August 1983 is:

For service before August, 1983:

Males (members or survivors) – 1971 GAM for males
Females (members or survivors) – 1971 GAM for males, set back 6 years

For service after August, 1983:

Members (male or female) – 1971 GAM for males, set back 6 years
Survivors (male or female) – 1971 GAM for males

Military Service

Act 2012-181, effective December 31, 2012, brought SERS into compliance with the federal Heroes Earnings Assistance and Relief Tax Act of 2008 (HEART Act) and Uniformed Services Employment and Reemployment Rights Act of 1994 (USERRA) for State employees who go on military leave, and revised the purchase price formula for nonintervening military service for members seeking to purchase nonstate service credit for military service that does not qualify for USERRA benefits or that was performed before becoming a State employee. The primary impacts of Act 181 are:

(i) Employees who return from USERRA qualified military leave receive vesting credit, even though they do not make member contributions to purchase credited service for the military leave.

(ii) Employees who return from USERRA qualified military leave may make the member contributions that they would have made had they not gone on military leave and if they do so will be treated as if they remained in active State service for that time.

(iii) Employees who die on military leave receive all SERS benefits that they would have received, except benefit accruals, as if they had returned to State service the day before their death.

(iv) The Pennsylvania Military and Veterans Code provisions allowing State employees on military leave to continue to make member contributions and remain active members of SERS while on military leave have been repealed.

Benefit and Contribution Provisions as of December 31, 2019 (continued)
(as embodied in Act 31 of 1974, and amended through Act 5 in June 2017)

(v) The purchase price for nonintervening military service for Class A-3 and Class A-4 members has been revised from the full actuarial value formula established in Act 2010-120 to the formula used by State employees who are members of the other classes of service, which is based on employee and employer normal contribution rates and the employees' compensation.

Given the past approach to funding the impact of military service-related events among SERS members, and considering the overall changes in benefits related to military service and military leave resulting from Act 181, it was determined that Act 181 had no material impact on the future actuarial funding of SERS and thus did not produce a cost added by legislated benefit improvements that needed to be reflected in the final contribution rate.

Compliance With Federal and State Laws

Act 2015-93, signed into law in December of 2015, instituted several technical, tax-related requirements for SERS in an effort to maintain the SERC's compliance with federal and state laws, including the Internal Revenue Code. Many of these technical changes were transparent to SERS members, and most of the other changes affected only a few State employees.

These changes included:

- Retiree return to service rules, allowing annuitants to return to active service in limited circumstances, were structured to satisfy federal requirements
- Minimum vesting standards were established in the event the SERS pension plan is closed
- Benefit limits for higher salaried or longer service employees and the handling of pickup contributions
- Maximum contribution and minimum distribution rules, and death benefit parameters
- Coordination of retirement benefits between SERS and PSERS to ensure that any combined benefit does not exceed the IRS maximum distribution limit

SERS' actuaries have determined that Act 2015-93 had no material impact on the future actuarial funding of SERS, and thus did not produce a cost added by legislated benefit improvements that needed to be reflected in the final contribution rate.

Actuarial Assumptions

This schedule shows the actuarial assumptions used for the valuation. With the exception of the investment return assumption, the inflation assumption, and the salary growth assumption, these assumptions were adopted by the Board in March of 2016 based upon a review of SERS experience from 2011 through 2015. To ensure that the investment return assumption remains up-to-date and appropriate for every actuarial valuation, it is reviewed annually by the SERS actuaries and Board. As a result of the review undertaken during June of 2019, the Board approved a reduction in the annual investment return assumption from 7.25% to 7.125%. The change was implemented with the December 31, 2019 actuarial valuation.

Schedule O contains an extract of the full set of rates used in the valuation. The full set of rates is in the March 9, 2016 report, *Commonwealth of Pennsylvania State Employees' Retirement System 18th Investigation of Actuarial Experience – January 1, 2011 to December 31, 2015*, which can be referenced on the SERS website. The rates are the probabilities that an event will occur in the year after the valuation and are all assumed to occur at the beginning of the year. For example, the male retirement rate of 25.0 percent at age 60 means that 250 of every 1,000 male employees age 60 and who are eligible for full benefits are expected to retire at the date of the valuation.

Interest Rate (Investment Return): 7.125 percent compounded annually. The assumed interest rate of 7.125 percent is the investment return less investment expenses.

Inflation Rate: 2.60 percent compounded annually.

Mortality After Retirement:

Non-disabled Retirees, Beneficiaries and Survivors: The RP-2000 Male and Female Combined Healthy Mortality Tables projected (using Projection Scale AA) to 2016 for males and to 2020 for females, and then further adjusted to ensure sufficient margin for improvement in certain age ranges. Each table includes a margin for future improvement in life expectancy.

Disability Retirees: The RP-2000 Male and Female Disabled Retiree Mortality Tables projected (using Projection Scale AA) to 2021 for males and to 2017 for females. Each table includes a margin for future improvement in life expectancy.

Spouse Age Difference: Females are assumed to be 2 years younger than males.

Actuarial Assumptions (continued)

Demographic Assumptions for General Employees while Active Members

Rates of Separation for Eligibility for Full Unreduced Benefits
(35 years of credited service under age 60; 3 years of credited service over age 60)

Representative Rates of Separation for Eligibility for Full Unreduced Benefits		
Age	**Male**	**Female**
53	20.0%	23.0%
54-55	23.0	23.0
56-57	24.0	23.0
58	27.0	23.0
59	30.0	25.0
60	25.0	25.0
61	20.0	20.0
62	25.0	25.0
63 – 64	20.0	20.0
65 – 66	25.0	25.0
67 – 70	23.0	23.0
71 – 79	20.0	20.0
80	100.0	100.0

Rates of Separation for Eligibility for Reduced Benefits
(only apply to members not eligible for full unreduced benefits)

Representative Rates of Separation for Eligibility for Reduced Benefits				
	5 – 14 Years of Credited Service		**15 or More Years of Credited Service**	
Age	**Male**	**Female**	**Male**	**Female**
25	2.0%	3.7%	N/A	N/A
30	1.6	1.9	N/A	N/A
35	1.6	1.9	1.0%	1.2%
40	1.6	1.9	1.0	1.2
45	1.35	1.9	1.0	1.6
50	1.35	1.9	2.0	2.0
55	1.35	1.9	6.0	6.0

Actuarial Assumptions (continued)

Rates of Separation Due to Withdrawal
It is assumed that the benefit will be reduced from age 58 for general members (to factor 35 years of service before age 60) and from age 50 for members eligible for age 50 retirement.

Representative Rates of Separation Due to Withdrawal								
	Male				Female			
	Years of Credited Service				Years of Credited Service			
Age	0	5	9	14	0	5	9	14
20	24.2%	N/A	N/A	N/A	28.4%	N/A	N/A	N/A
25	18.5	3.0%	2.1%	N/A	22.4	3.7%	2.3%	N/A
30	16.4	3.0	2.1	1.0%	19.2	3.3	2.3	1.7%
35	15.6	2.4	1.3	1.0	15.0	3.2	2.3	1.2
40	15.0	2.4	1.3	1.0	13.4	3.2	1.2	1.0
45	14.4	2.4	0.7	1.1	13.1	2.7	1.2	1.0
50	14.4	2.6	0.7	1.1	13.1	2.7	1.5	1.0
55	14.4	1.9	0.8	0.8	13.1	1.8	1.0	1.6

Rates of Separation Due to Death and Disability
(Disability rates only apply to members not eligible for full retirement)

Representative Rates of Separation Due to Death and Disability				
	Death		Disability	
Age	Male	Female	Male	Female
20	0.04%	0.02%	N/A	N/A
25	0.04	0.02	0.02%	0.04%
30	0.05	0.02	0.06	0.09
35	0.06	0.03	0.11	0.14
40	0.09	0.04	0.17	0.19
45	0.13	0.06	0.30	0.30
50	0.24	0.09	0.42	0.45
55	0.29	0.14	0.55	0.57
60	0.35	0.24	N/A	N/A

Actuarial Assumptions (continued)

For Special Benefit Classes if Different from General Employee Rates:

Rates of Separation Due to Withdrawal			
Years of Service	State Police/ Hazardous Duty	Legislators	Judicial Officers
0	9.0%	4.0%	1.0%
1	4.0	4.0	1.0
2	3.0	4.0	0.3
3	3.0	4.0	0.3
4	2.0	4.0	0.3
5	1.0	4.0	0.3
6	1.0	4.0	0.3
7	0.5	12.0	0.3
8	0.5	12.0	0.3
9	0.5	12.0	0.3
10+	0.2	1.6	0.3

Rates of Separation Due to Early Retirement at Any Age		
State Police/ Hazardous Duty	Legislators	Judicial Officers
1.4%	2.7%	0.2%*

* The Judicial Officer rate increases to 1.8% beginning at age 50.

Representative Rates of Separation Due to Retirement other than State Police with 19 or More Years of Credited Service			
Age	State Police/ Hazardous Duty	Legislators	Judicial Officers
50	10.0%	5.0%	N/A
55	10.0	5.0	5.0%
60	19.0	5.0	5.0
65	27.0	11.0	10.0
70	32.0	15.0	100.0
75	32.0	15.0	N/A
80	100.0	100.0	N/A

Actuarial Assumptions (continued)

Rates of Separation due to Retirement for State Police with 19* or More Years of Credited Service			
Years of Service	Rate	Years of Service	Rate
19* – 23	1.0%	30	50.0%
24*	50.0	31 – 32	40.0
25	70.0	33 – 39	50.0
26 – 29	40.0	40+	100.0

* State Police with 19 and 24 years of service at the beginning of the year are assumed to retire at the point they reach 20 and 25 years respectively during the year and to receive the FOP award.

Years of Service Purchased by Eligible Members

Service	Number of Years Purchased
0	0.4
1	0.3
2	0.2
3	0.1
4+	0.0

It is assumed that the member will elect to pay for the reduction through an actuarial debt and that all purchased service is a 2 percent accrual. Under Act 2010-120 and Act 2012-181, the assumed years purchased as shown above were reduced by 9% for Classes A-3 and A-4.

Form of Payment: Members are assumed to elect the maximum benefit 32 percent of the time, some form of joint and survivor annuity 25 percent of the time, and some form of guaranteed present value (including joint and survivor with a guaranteed present value) 43 percent of the time. Also, 80 percent of members are assumed to elect a full Option 4 withdrawal of contributions and interest.

Career Salary Increases

The career salary scale shown on the following page includes average increases in the employee salary due to promotions and longevity growth. The average career salary growth is 2.65 percent per year.

Actuarial Assumptions (continued)

In addition, it is assumed that the salary schedules will increase by 2.9 percent per year. The scale below does not include the assumed 2.9 percent general salary increase.

Career Salary Scale for Members			
Years of Credited Service	Annual Increase	Years of Credited Service	Annual Increase
1	6.00%	16	2.10%
2	4.50	17	2.05
3	4.00	18	2.00
4	3.75	19	1.95
5	3.50	20	1.90
6	3.25	21	1.85
7	3.00	22	1.75
8	2.90	23	1.65
9	2.80	24	1.55
10	2.70	25	1.45
11	2.60	26	1.25
12	2.50	27	1.05
13	2.40	28	0.90
14	2.30	29	0.85
15	2.20	30+	0.80

The above scale does not apply to members in Classes D and E. It is assumed that only the general salary increase (2.9 percent per year) would apply to members in these classes.

Actuarial Assumptions (continued)

Class A-3 and A-4 Assumptions

The tables below are the early and superannuation retirement rates applicable to Class A-3 and A-4 members.

Early Retirement Rates for Class A-3 and Class A-4 Active Employees with 10 or more Years of Service	
Age	**Rate**
35	1.5%
40	1.5
45	1.5
50	2.0
55	5.5
60	5.5
61	6.0
62	20.0
63	10.0
64	15.0
65	N/A

Superannuation Retirement Rates for Class A-3 and Class A-4 Employees	
Age	**Rate**
55	15.0%
56	16.0
57	17.0
58	18.0
59	19.0
60	20.0
61	20.0
62	25.0
63	20.0
64	20.0
65	25.0
66 to 79	20.0
80	100.0

Actuarial Assumptions (continued)

Class A-5 and A-6 Assumptions

The tables below are the early and superannuation retirement rates applicable to Class A-5 and A-6 members.

Early Retirement Rates for Class A-5 and Class A-6 Active Employees with 10 or more Years of Service	
Age	**Rate**
35	1.5%
40	1.5
45	1.5
50	2.0
55	5.5
60	5.5
61	6.0
62	8.0
63	10.0
64	10.0
65	15.0
66	20.0
67	N/A

Superannuation Retirement Rates for Class A-5 and Class A-6 Employees	
Age	**Rate**
55	15.0%
56	16.0
57	17.0
58	18.0
59	19.0
60	20.0
61	20.0
62	25.0
63	20.0
64	20.0
65	25.0
66 to 79	20.0
80	100.0

Actuarial Methods

I. Asset Valuation

The actuarial value of assets is developed by recognizing the difference between the expected actuarial value of assets and the market value of assets over a five-year period. The expected actuarial value is last year's actuarial value brought forward to reflect actual contributions, benefit payments and expenses, and assumed investment income. Each year, 20 percent of the difference between this expected value and the market value is recognized in determining the current actuarial value of assets with the remaining 80 percent to be recognized over the next four years.

II. Funding Method

The State Employees' Retirement System's funding policy provides that the actuary determine employer contribution rates that will amortize liabilities over a ten-year or 30-year period beginning with the July following the measurement of the liability. See Section III below for details regarding the specific liabilities subject to amortization and the applicable amortization periods. This policy assures that SERS is appropriately funded and also that the fund will accumulate sufficient assets to pay benefits when they are due. The policy is set by the State Employees' Retirement Board in conformance with specific legal requirements as to the method of funding.

A variation of the Entry-Age Actuarial Cost Method is used to determine the liabilities and costs related to all SERS' benefits including retirement, withdrawal, death and disability benefits. The significant difference between the method used for SERS and the typical Entry-Age Actuarial Cost Method is that the normal cost is based on the benefits and contributions for new employees rather than for all current employees from their date of entry. SERS' variation should produce approximately the same results as the typical method over the long run.

III. Determination of the Annual Contribution

The annual employer contribution is equal to the sum of the following:

(1) The employer share of the normal cost.
(2) The fresh start amortization of the December 31, 2009 unfunded liability over a 30-year period beginning July 1, 2010 and ending on June 30, 2040.
(3) The amortization of the change in liability due to Act 2010-120 over a 30-year period beginning July 1, 2011 and ending on June 30, 2041.
(4) The amortization of changes in liability due to actual experience differing from assumed experience after December 31, 2009 over 30-year periods beginning with the July following the actuarial valuation determining such changes.
(5) The extra contribution to return Act 5 savings.
(6) The amortization of legislated benefit changes, including cost-of-living increases, over 10-year periods beginning with the July following the actuarial valuation determining such changes. (Note: There are currently no 10-year amortizations being funded.)

Actuarial Methods (continued)

The amortization payments are level amounts over the remaining applicable amortization period. The employer cost is determined as a percent of compensation, and the employer contributes that percent of the compensation of all covered members during each fiscal year. The employer contribution level for fiscal year 2020/2021 is the total of (1) the employer normal cost percent and (2) the net amortization payment for fiscal year 2020/2021 divided by the projected covered compensation for the fiscal year and (3) the extra contribution to return Act 5 savings.

Act 2017-5 introduced an extra contribution to return the projected savings generated by the legislative changes. These extra contributions are statutory amounts, expressed as a percentage of all SERS covered compensation, that are payable for 13 fiscal years starting July 1, 2019 and ending June 30, 2042. The following table shows the required extra contribution rates:

Extra Contribution to Return Act 5 Savings	
Fiscal Years	**Extra Contribution Rates**
2020	0.71%
2021	0.66
2022	0.62
2023-2032	0.00
2033	0.10
2034	0.22
2035	0.33
2036	0.43
2037	0.53
2038	0.62
2039	0.71
2040	0.79
2041	0.86
2042	0.93
2043+	0.00

The 2020/2021 employer contribution rate is 33.45 percent. The contribution collars from Act 120 no longer apply. Hereafter, contributions are subject to a minimum employer contribution rate equal to the employer normal cost percent.

The assumptions used in determining the actuarial cost are stated in Schedule O, and the employer cost, as a percent of covered compensation, is determined in Schedules A and B. Except for the 7.125 percent investment return assumption, which was changed with the December 31, 2019 valuation, and the 2.60 percent inflation assumption, which was changed starting with the December 31, 2016 valuation, the assumptions used for the current valuation were based upon an evaluation of SERS experience from 2011 through 2015.

Actuarial Methods (continued)

The annual investment return assumption is 7.125 percent compounded annually. Salary growth is the total of assumed increases in salary rates and career salary growth. It is generally assumed that the total payroll will increase at 2.9 percent per year and that employee career salary growth (promotion and longevity growth) will average an additional 2.65 percent per year. Therefore, the average total salary growth for an individual will generally be 5.55 (2.9 plus 2.65) percent per year. The investment return and the salary rate increase assumptions are based on an assumed underlying inflation of 2.60 percent per year.

All costs and liabilities have been determined in conformance with generally accepted actuarial principles and procedures in accordance with the principles of practice prescribed by the Actuarial Standards Board of the American Academy of Actuaries. The calculations were performed on the basis of actuarial assumptions and methods which are reasonable (taking into account the past experience of SERS and reasonable expectations) and which represent our best estimate of anticipated experience under the plan.

IV. Allocation of the Annual Contribution Among Employer Groups

The annual employer contribution (total employer cost) is expressed as a percentage of the total projected covered compensation for active members. This amount is reflected on Schedule B, line IV, and is referred to as the total employer cost. The total employer cost is the average contribution amount that needs to be received from the employer groups participating in the system. Therefore, some employer groups contribute a higher percent of compensation, and some employer groups contribute a lower percent of compensation.

Schedule C develops the contribution rate for each of the employer groups. The allocation method used to determine the employer rate takes into consideration the cost of additional benefits for special classes of members. For example, the contribution rate for Class E members takes into consideration the additional accrual rate those members receive at retirement. The Base Contribution Rate (column 2 on Schedule C) is determined as the percentage needed to produce employer contribution amounts by class that, when added together, equal the total employer contribution.

The following is an explanation of the elements of Schedule C.

Column (1) is the employer group.

Column (2) is the Base Contribution Rate. The Base Contribution Rate is the amount needed to fund the benefits for Class A-5 and A-6 members. Because the majority of SERS new entrants beginning in 2019 are covered under Classes A-5 and A-6, a blend of the 1.25 percent and the 1.0 percent annual benefit accrual rates is used to determine the Base Contribution Rate. The Base Contribution Rate also includes (initially) the employer contribution to the Defined Contribution (DC) Plan; however, the adjustment applied in Column (5) (ultimately) deducts the DC Plan rate.

Actuarial Methods (continued)

Column (3) is the additional cost for members who are eligible to retire with unreduced benefits at age 50 or 55. The age 50/55 normal cost is determined for two groups of members: members who can retire at age 50/55 if they have 3 years of credited service, and members who can retire at age 50/55 once they obtain 20 service credits. Park Rangers and Capitol Police fall into the latter category. The additional cost for members who can retire at age 50/55 if they have 3 years of credited service is larger than the additional cost for members who can retire at age 50/55 if they have 20 years of credited service.

Column (4) is the multiplier adjustment to the basic benefit, which is applicable to members in classes that receive a different percent accrual rate than the accrual rate for Class A-5 and A-6 members. The normal cost is determined for a blended group of members who would receive the 1.25 percent or 1.0 percent single life annuities set by Act 5 (for Classes A-5 and A-6, respectively). For example, members in Class AA receive an annuity equal to 2.0 times the Class A-5 single life annuity and 2.5 times the Class A-6 single life annuity (which blends to 2.02 based on the expected Class elections). The multiplier adjustment (Column (4)) for Class AA is 1.8819, which consists of the initial 2.02 multiplier adjusted (net downward) for various differences between Classes A-5 and A-6 versus Class AA, including: the Defined Contribution Plan component of Classes A-5 and A-6, differences in the applicable superannuation ages and differences in the handling of the cost of Option 4 withdrawals. There currently are no multiplier adjustments less than the 1.0.

Column (5) is an adjustment for either the employer contribution to the Defined Contribution Plan or the past-service liability component for certain employee groups. For new entrants in Classes A-5 and A-6 or the DC Only Plan, the total employer contribution for each of these groups is intended to be the same (except for the DC Only Plan which does not make a BCP Plan contribution). The adjustment for each of these three employee groups backs out the Defined Contribution Plan contribution so that only the net Defined Benefit Plan contribution remains.

Column (5) also adjusts for employee groups who were granted benefit improvements that were retroactive at the date of passage. Upon establishment of a benefit improvement it was determined that the employers of the individual employee group, not the Commonwealth, would fund the benefit improvement.

At implementation of the new benefit provision, a liability is established for the members who are eligible for the new benefit provisions, and a schedule is determined to pay off the increase in liability. For example, Park Rangers and Capitol Police Officers were formerly covered under the age 60 retirement provisions. Effective with the valuation at December 31, 1992, Park Rangers and Capitol Police Officers became eligible to retire at age 50 upon attaining 20 years of service (as Park Rangers and Capitol Police Officers). At that valuation, a liability was established that would fund the increase in benefits.

The liability for the increase in benefits for past service is paid off in equal installments by the employers of the member group. Each year, the annual contribution as a percent of payroll is

Actuarial Methods (continued)

determined as the annual payment divided by the funding payroll for the group. The outstanding balance is carried forward with interest each year.

The following table shows the payment schedule for the two groups of employees who have a past service liability.

Amortization Schedule for Past Liabilities		
Employer Group	**Payment**	**Last Payment (fiscal year beginning)**
State Police	$17,252,587	July 2029
Park Rangers / Capitol Police	$85,642	July 2027

Column (6) is the adjusted contribution rate and is equal to column (2) plus column (3), multiplied by column (4). Column (5) is added.

Column (7) is the projected compensation for the class of employees. The projected compensation is for the fiscal year to which the contribution rate is applicable.

Column (8) is the dollar amount of the employer group contribution. The sum of the dollar amounts for each group is (approximately) equal to the total employer contribution (as a percent of covered compensation) multiplied by the total projected covered compensation for the active members.

V. Plan Provisions Not Valued

The cost effect of two plan provisions was not included in this valuation because the effect of the provisions is minimal. These are the limit on the amount of retirement benefit imposed by Section 5702(c) (100 percent limit) and the supplemental death benefit payable when the retirement benefit is limited by Section 5702(c).

These two provisions are not valued because they only apply to very few SERS members. Since by definition the liability for the supplemental death benefit is lower than the reduction in liability for the 100 percent limit, the net effect of not including these provisions in the actuarial valuation is a minimal overstatement in the total employer cost.

VI. Determination of Present Value of Benefits for Inactive and Vested Members

The present value of benefits for inactive members not currently receiving benefits is determined using the same methods and procedures as for active members. They are valued using the final average compensation and service as of separation and are assumed to begin receiving benefits in accordance with the active employee assumptions.

Glossary

Accrued Service. Service credited under the system, which was rendered before the date of the actuarial valuation.

Active Members and Participants. Active members and participants who are in a position covered by SERS and on payroll, on leave with pay, or on certain unpaid leave (e.g., military leave). Inactive members and participants on leave without pay are also included as active if there is an expectation they will return to paid service.

Actuarial Accrued Liability. The portion of the actuarial present value of benefits not provided for by the actuarial present value of future normal costs. Also referred to as Past Service Liability.

Actuarial Assumptions. Estimates of future experience with respect to rates of mortality, disability, turnover, retirement, investment income and salary growth. Decrement assumptions (rates of mortality, disability, turnover and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (salary increases and investment income) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.

Actuarial Cost Method. A mathematical budgeting procedure for allocating the actuarial present value of future benefits between future normal costs and the actuarial accrued liability.

Actuarial Present Value. The amount of funds currently required to provide a payment or series of payments in the future. It is determined by discounting projected future payments at assumed rates of interest and probabilities of payment.

Actuarially Determined Contribution (ADC). The annual employer contribution calculated by the actuary based on a defined actuarial cost method, asset valuation method, and amortization method. The ADC may or may not be the amount actually paid by the employer. The methods used to calculate the ADC are contained in Schedule P.

Amortization. Paying off an amount with periodic payments of interest and principal -- as opposed to paying off with a lump sum payment.

Annuitants. Participants of SERS who are currently receiving benefits for reason of superannuation retirement, early retirement, deferred retirement, or disability retirement.

Beneficiaries and other payment recipients. Beneficiaries, survivors or alternate payees who are receiving benefits as a result of the death of an active member or annuitant or due to a divorce (based upon a domestic relations order).

Funding Payroll. The contribution determinations for the funding of SERS are based on a fiscal year running from July 1 to June 30. The Total Annualized Compensation is adjusted to an appropriate fiscal year Funding Payroll using the salary scale assumption and expected turnover and replacement estimates.

Glossary (continued)

Inactive and Vested Participants. In general, inactive and vested participants are former active members who are not expected to return to paid service in a position covered by SERS. Inactive and vested participants include employees on furlough as well as employees with prior SERS service currently participating in the Pennsylvania Public School Employees' Retirement System (PSERS). All inactive and vested participants are entitled to either a refund of accumulated deductions from SERS or a monthly benefit. Inactive and vested participants will eventually change statuses; for example, they may terminate non-vested and receive a refund of their accumulated deductions, they may retire and commence annuity payments, they may return to active membership, etc.

Total Annualized Covered Compensation. The Total Annualized Covered Compensation is a snapshot of compensation on December 31. For full-time employees, it is equal to the compensation during the calendar year ending December 31. For part-time employees, compensation is annualized using the current rate of compensation times the appropriate number of pay periods.

Total Normal Cost. The portion of the actuarial present value of future benefits that is allocated to the current year by the actuarial cost method.

Unfunded Actuarial Accrued Liability. The difference between actuarial accrued liability and the actuarial value of assets.

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