



2019

Comprehensive Annual Financial Report

With Independent Auditors' Report for Fiscal Years Ended
December 31, 2019 and 2018

Commonwealth of Pennsylvania
State Employees' Retirement System

A Component Unit of the Commonwealth of Pennsylvania



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State Employees' Retirement System

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Prepared by the staff of the
Pennsylvania State Employees' Retirement System

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INTRODUCTORY SECTION

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For its Comprehensive Annual
Financial Report
for the Fiscal Year Ended

December 31, 2018

Christopher P. Morrill

Executive Director/CEO



Public Pension Coordinating Council

***Public Pension Standards Award
For Funding and Administration
2019***

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Pennsylvania State Employees' Retirement System

In recognition of meeting professional standards for
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Presented by the Public Pension Coordinating Council, a confederation of

National Association of State Retirement Administrators (NASRA)
National Conference on Public Employee Retirement Systems (NCPERS)
National Council on Teacher Retirement (NCTR)

A handwritten signature in cursive script that reads "Alan H. Winkle".

Alan H. Winkle
Program Administrator

May 31, 2020

Mr. David R. Fillman
Chairman, State Employees' Retirement Board
Commonwealth of Pennsylvania
30 North Third Street, Suite 150
Harrisburg, PA 17101

Dear Chairman Fillman,

The Pennsylvania State Employees' Retirement System (SERS) is pleased to present you with the 2019 calendar year Comprehensive Annual Financial Report (CAFR). The purpose of this report is to provide the governor, legislature, system members, participants, and annuitants, as well as the public with a clear accounting of SERS operations and financial position. We hope you will find this financial, investment, actuarial, and statistical material produced by SERS management to be both interesting and useful.

SERS remains committed to delivering accurate, meaningful information to policymakers and SERS members, as well as to provide context for our independently audited financial statements.

SERS administers four retirement plans for state employees – three plans require mandatory employee and employer contributions and one plan allows only voluntary employee contributions:

- **Hybrid Plan** – is a combination of two Internal Revenue Code-defined plans – a traditional pension or IRC section 401(a) defined benefit plan with an IRC section 401(a) defined contribution investment plan. This plan requires mandatory contributions from both the employee and the employer. There are two classes of service within the Hybrid Plan, class A-5 and class A-6.
- **Defined Contribution Plan** – is an IRC section 401(a) investment plan. This plan requires mandatory contributions from both the employee and the employer.
- **Defined Benefit Plan** – is a traditional pension plan defined by IRC section 401(a). This plan requires mandatory contributions from both the employee and the employer.
- **Deferred Compensation Plan** – is a voluntary supplemental plan defined by IRC section 457(b). This plan allows only voluntary employee contributions. (Note: The DCP has its own stand-alone financial statements and is not included in the CAFR).

Most new state employees are automatically enrolled in the Hybrid Plan A-5 class of service, with the right to opt out of that class of service into the Hybrid Plan A-6 class of service or the defined contribution-only plan. The exceptions are hazardous-duty employees and those who contributed to the traditional defined benefit pension plan in the past. In those two cases, the employee is automatically enrolled in the traditional defined benefit pension plan.

All SERS members, as of January 1, 2019, were given a one-time, irrevocable option to switch to either one of the hybrid plan classes of service or the defined contribution-only plan. Sixty-eight members opted into one of the new plans.

For 2019, KPMG LLP has conducted an independent audit of SERS financial statements, which are prepared in accordance with U.S. generally accepted accounting principles. Because the cost of a control should not exceed the benefits to be derived, the objective is to provide reasonable, rather than absolute, assurance that SERS financial statements are free of any material misstatements and fairly presented. As is our standard practice, independent auditors have full and unrestricted access to you and the board to discuss their findings regarding the adequacy of SERS internal controls and the integrity of SERS financial reporting.

SERS again received an unmodified opinion in 2019.

The Defined Contribution Plan opened for enrollment on January 1, 2019. As of December 31, 2019, there were over 8,000 accounts established and the plan had assets of approximately \$12.4 million. The plan receives participant and employer contributions and the participant can choose to invest their money in several investment options, with most plan participants investing in the default option of a target date fund. More information regarding this plan can be found in the Management's Discussion and Analysis within the Financial Section, while the remainder of the financial information in this letter is for the Defined Benefit Plan only.

Members and the SERS Board can be assured that their retirement system is administered well, and that staff carefully manages the funds entrusted to the board. As of December 31, 2019, the SERS' Defined Benefit Plan had approximately \$31.1 billion after paying out approximately \$3.5 billion in retirement benefits to more than 132,000 retirees and beneficiaries; \$3.2 billion was paid to people living in Pennsylvania, stimulating local economies.

In 2019, SERS served 102 agencies/employers and approximately 243,000 total members.

In mature pension plans such as SERS, newly retired members entering the pension rolls tend to have higher benefits than those who die and are removed from rolls. SERS' experience reflects that trend. In 2019, approximately 6,100 SERS members retired with an average annual benefit of about \$28,800, while approximately 4,400 retirees with an average annual benefit of about \$16,300 were removed from the rolls.

The past year, 2019, saw a dramatic rebound across all asset classes. As a result, SERS experienced investment gains of nearly 19% for our Defined Benefit Plan, more than double the fund's assumed rate of return. Positive investment performance contributed approximately \$5.2 billion to net investment income in 2019.

Thanks to these positive returns, along with our continued push toward greater efficiencies and transparency, as well as four consecutive years of full funding of the actuarially required contribution from the General Assembly, SERS continues to progress toward our long-term goal of eliminating our unfunded liability.

Now that SERS employers are paying the full "uncollared" contribution amount, plus making extra "plowback" contributions to return Act 2017-5 savings, there has been a positive impact on paying down the unfunded liability. This funding is crucial for the overall long-term health of the pension system.

Based on the GASB 67 accounting valuation as of December 31, 2019, the resulting net pension liability was \$18.2 billion. SERS plan fiduciary net position as a percentage of the total pension liability was 63.1%. Based on the actuarial methods used for funding purposes, as of December 31, 2019, the unfunded actuarial accrued liability was \$23.0 billion. SERS funded ratio was 56.5%.

A high level of volatility in 2018 led to an unanticipated delay in the pace of employer contribution reductions. The impact of much improved investment results in 2019 on FY 2020-21 employer contributions was mitigated somewhat by the SERS Board's decision to reduce the assumed rate of return from 7.25% to 7.125%. In FY 2020-21, the composite employer contribution rate will be 33.48% of payroll. This is estimated to generate approximately \$2.2 billion.

It should be noted that Act 2017-5 included a savings "plow-back" provision requiring that the annual savings achieved through SERS' benefit changes flow back into the system rather than to other non-pension obligations. The 33.48% projected employer contribution rate for FY 2020-21 includes a savings return of 0.66%. Without the plow-back provision, the employer rate would have been lower. The plow-back contributions, currently calculated to range from 0.10% to 0.93% of payroll, are expected in 12 of the next 22 fiscal years and will work to accelerate the systems' return to fully funded status.

While future contribution rates depend on future returns and experience, current projections indicate SERS' funded ratio will reach the 80% threshold generally accepted by pension experts as "healthy" by 2033. Pennsylvania is among nearly two-thirds of public pension plans currently below the 80% funding threshold.

The annual cost of the plan continues to drop as the number of members in the newer classes of service, including the A-3 and A-4 classes and the new A-5, A-6, and defined contribution classes that opened January 1, 2019, increases.

SERS continues major initiatives to improve services to our stakeholders, as well as improving efficiencies in the delivery of benefits and reducing cost in the administration of the system.

Investment strategies seek the highest-conviction investment opportunities within an acceptable level of risk. To be more responsive to our members and reduce transaction costs, we continue to increase the volume of electronic funds transfers for benefit payments. This initiative has reduced waiting periods for benefit payments and increased the security of delivery of our members' money. Improving customer service to our members remains a top priority for the plan. We continue to enhance our member materials, striving to make the information contained within more understandable and accessible to a range of employees. We increasingly leverage technology to deliver many of these materials electronically, allowing the plan to reduce administrative costs and employ data-driven results to help guide future communication initiatives. SERS is also working to complete its multi-year benefits processing system upgrade that is expected to further improve how we interact with our members, their account-related transactions, and payment processing.

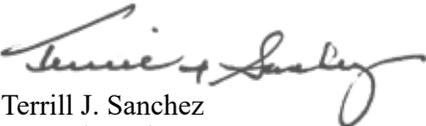
Throughout 2019, the SERS Board and staff continued to review and act upon key initiatives based on recommendations from the report issued in December 2018 by the Public Pension Management and Asset Investment Review Commission (part of Act 2017-5).

With an eye toward increased transparency, the SERS Board approved standard formats for specialty consultant performance reports, staff memos, consultant memos, and a recommended template for manager presentations that ultimately will be posted on SERS' website. The board also approved a *Stress Testing and Risk Assessment* report, developed by SERS' actuarial firm, Korn Ferry, in coordination with SERS' investment consultant, Callan. The report reviewed a wide range of investment-related, contribution-related, and demographic-related risks that could affect the long-term health and stability of the fund. At the direction of the SERS Board, the Executive Director and staff continue to explore measures to further enhance the financial stability of the system through the establishment of a dedicated funding stream and other supporting strategies.

We are solely responsible for the contents of this report; however, we do wish to acknowledge the significant contributions of many SERS professionals whose work to compile, quality assure, and produce it is essential.

The commitment of the agency's 200+ employees ensures that we maintain effective internal controls to assure that assets are safeguarded, transactions are properly executed, and financial statements conform to U.S. generally accepted accounting principles – all while providing effective, high-quality member services. SERS remains dedicated to providing the highest level of service to commonwealth employers, policymakers, employees, retirees, and the SERS Board. Staff at all levels strive to provide exceptional service to those who have dedicated their careers to the citizens of Pennsylvania and maintain careful stewardship of public dollars.

Respectfully submitted,


Terrill J. Sanchez
Executive Director


Alicia E. James, CPA
Chief Financial Officer

SERS Mission, Vision, and Organizational Chart

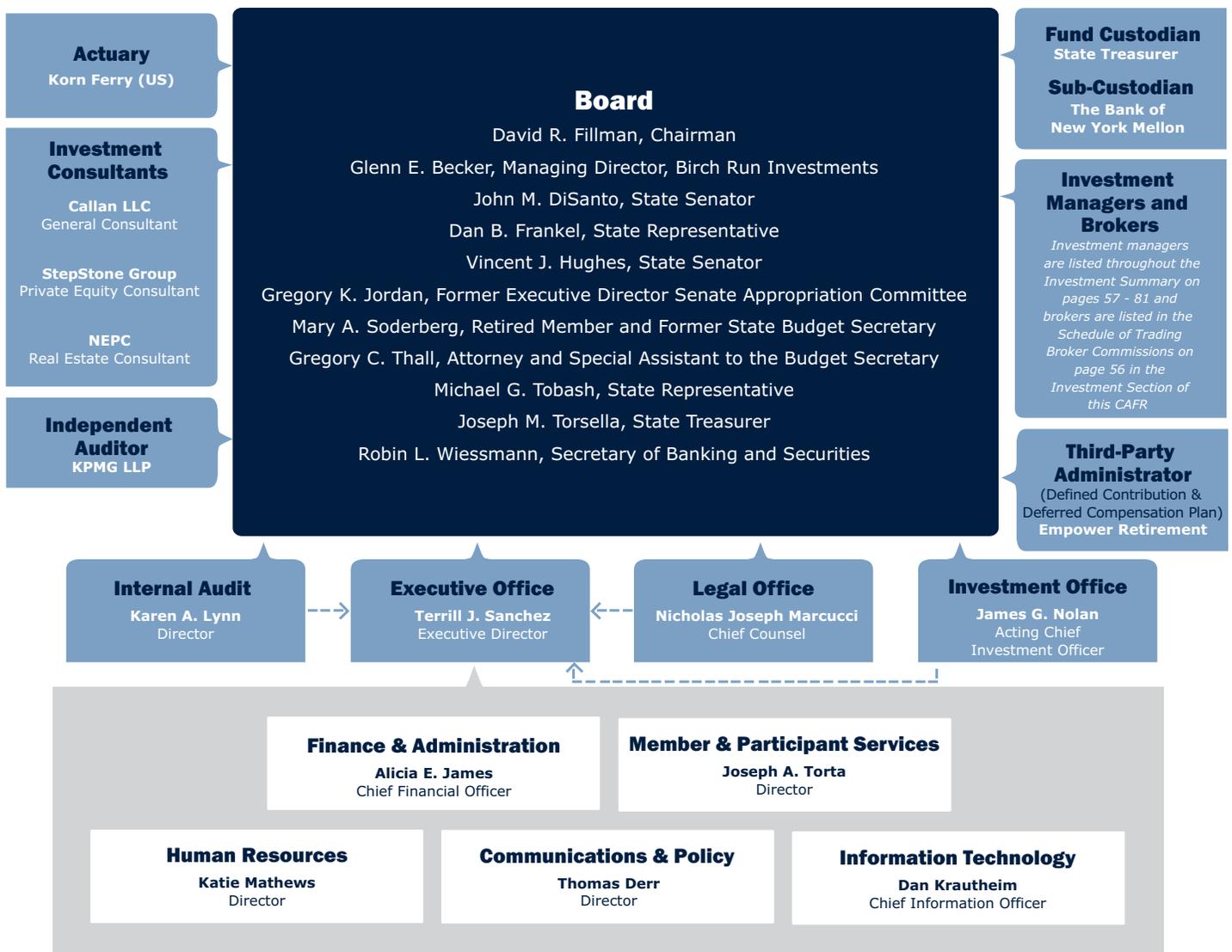
Mission

The mission of SERS is to provide retirement benefits and services to our members through sound administration and prudent investments.

Vision

SERS' vision is to navigate organizational, fiscal, and legislative challenges so that SERS continues to progress toward fully-funded status while enhancing and sustaining effective and responsive member services.

Organizational Chart



As of 12/31/19

INTRODUCTORY SECTION

SERS Board

December 31, 2019

Mr. David R. Fillman
Chairman
Executive Director, AFSCME Council 13



Mr. Glenn E. Becker
Managing Director, Birch Run Investments



Honorable John M. DiSanto
State Senator



Honorable Dan B. Frankel
State Representative



Honorable Vincent J. Hughes
State Senator



INTRODUCTORY SECTION

SERS Board

December 31, 2019

Mr. Gregory K. Jordan
Former Executive Director Senate
Appropriation Committee

**Photo
Not
Available**

Honorable Mary A. Soderberg
Retired Member and Former
State Budget Secretary



Mr. Gregory C. Thall
Attorney and Special Assistant to the
Budget Secretary



Honorable Michael G. Tobash
State Representative



Honorable Joseph M. Torsella
State Treasurer



Honorable Robin L. Wiessmann
Secretary of Banking and Securities



2019

Financial Section



KPMG LLP
Suite 1000
30 North Third Street
PO Box 1190
Harrisburg, PA 17108-1190

Independent Auditors' Report

The Members of the Board
Commonwealth of Pennsylvania
State Employees' Retirement System:

We have audited the accompanying financial statements of the Commonwealth of Pennsylvania State Employees' Retirement System (SERS), a component unit of the Commonwealth of Pennsylvania, as of and for the years ended December 31, 2019 and 2018, and the related notes to the financial statements, which collectively comprise SERS' financial statements as listed in the table of contents.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with U.S. generally accepted accounting principles; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditors' Responsibility

Our responsibility is to express an opinion on these financial statements based on our audits. We conducted our audits in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditors' judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, the financial statements referred to above present fairly, in all material respects, the fiduciary net position of the Commonwealth of Pennsylvania State Employees' Retirement System as of December 31, 2019 and 2018, and the changes in its fiduciary net position for the years then ended in accordance with U.S. generally accepted accounting principles.

KPMG LLP is a Delaware limited liability partnership and the U.S. member firm of the KPMG network of independent member firms affiliated with KPMG International Cooperative ("KPMG International"), a Swiss entity.



Other Matters

Required Supplementary Information

U.S. generally accepted accounting principles require that the management's discussion and analysis on pages 3–11 and the required supplementary information in schedules 1 through 3 on pages 43–44 be presented to supplement the financial statements. Such information, although not a part of the financial statements, is required by the Governmental Accounting Standards Board who considers it to be an essential part of financial reporting for placing the financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the financial statements, and other knowledge we obtained during our audit of the financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

Supplementary and Other Information

Our audits were conducted for the purpose of forming an opinion on the financial statements that collectively comprise SERS' financial statements. The supplementary information in schedules 4 and 5 on pages 45-46, and the other information in the introductory section, investment section, actuarial section, and statistical section as listed in the table of contents, are presented for purposes of additional analysis and are not a required part of the financial statements.

The supplementary information in schedules 4 and 5 is the responsibility of management and was derived from and relates directly to the underlying accounting and other records used to prepare the financial statements for the year ended December 31, 2019. Such information has been subjected to the auditing procedures applied in the audit of the financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the financial statements or to the financial statements themselves, and other additional procedures in accordance with auditing standards generally accepted in the United States of America. In our opinion, the supplementary information in schedules 4 and 5 is fairly stated in all material respects in relation to the financial statements as a whole.

The introductory, investment, actuarial and statistical sections have not been subject to the auditing procedures applied in the audit of the financial statements and, accordingly, we do not express an opinion or provide any assurance on them.

KPMG LLP

Harrisburg, Pennsylvania
May 29, 2020

Management's Discussion and Analysis

December 31, 2019 and 2018 (unaudited)

This section presents Management's Discussion and Analysis of the Pennsylvania State Employees' Retirement System's (SERS) financial statements, as well as the significant events and conditions that affected the operations and performance of SERS during the years ended December 31, 2019, 2018, and 2017.

In addition to historical information, the Management's Discussion and Analysis includes forward-looking statements, which involve currently known facts and certain risks and uncertainties. Actual results and performance may differ materially from those expressed or implied in the forward-looking statements due to a wide range of factors including but not limited to: changes in securities markets, general economic conditions, interest rates, legislation, and global conflicts.

Overview of the Financial Statements and Accompanying Information

SERS administers two mandatory-participation retirement plans defined by the Internal Revenue Code: the Defined Benefit Plan, for which assets are held in the State Employee Retirement Fund (Defined Benefit Plan or pension plan); and the Defined Contribution Plan established by Act 2017-5, for which assets are held in a trust with ownership attributed to individual participant investment accounts. The financial statements present the financial position and activities for the Defined Benefit Plan and the Defined Contribution Plan.

(1) Financial Statements. SERS presents Statements of Fiduciary Net Position as of December 31, 2019 and 2018 as well as Statements of Changes in Fiduciary Net Position for the years then ended. These statements reflect resources available for the payment of benefits as of year end, and the sources and uses of those funds during the year.

(2) Notes to Financial Statements. The notes to financial statements are an integral part of the statements. SERS encourages readers to review them because the additional detail will provide a more complete understanding of the financial

statements. The notes provide information about SERS' organization; benefits and contributions; determination of asset values; contingencies and commitments; actuarial liabilities and the associated methods and assumptions used to calculate them; and subsequent events that occurred after year end.

(3) Required Supplementary Information. The Required Supplementary Information (RSI) consists of:

- This Management's Discussion and Analysis (MD&A)
- A schedule of changes in net pension liability and related ratios
- A schedule of employer contributions
- A schedule of investment returns

(4) Other Supplementary Information Schedules. Other schedules provide details of SERS administrative, investment, and consultant expenses. Supplementary information is considered useful in understanding and evaluating the financial activities of SERS.

Financial Highlights

- In June 2019, the SERS Board approved a reduction in the pension plan investment return assumption from 7.25% to 7.125%. The new investment return assumption was used for the December 31, 2019, valuation.
- The time-weighted rate of return on investments for the pension plan was 18.8% for year ended December 31, 2019, compared to a -4.6% for year ended December 31, 2018. The return for the ten-year period ended December 31, 2019, was 8.1%, which exceeded the 7.125% investment return assumption.
- The net position for the pension plan increased by approximately \$4.2 billion for the year ended December 31, 2019, compared to a decrease of approximately \$2.4 billion for the year ended December 31, 2018, as reflected in

FINANCIAL SECTION

Management's Discussion and Analysis

December 31, 2019 and 2018 (unaudited)

the table on page 11. The increase in 2019 is mainly attributed to positive investment returns and the ongoing commitment of employers to pay the full amount of the actuarially determined contribution.

- The Defined Contribution Plan opened for enrollment on January 1, 2019. The net position for the Defined Contribution Plan was approximately \$12.4 million as of December 31, 2019. In 2018, the Defined Contribution Plan only incurred expenses for and received funding from the Commonwealth of Pennsylvania (commonwealth) for startup costs associated with this plan.

The Defined Benefit Plan

The Defined Benefit Plan is a traditional pension plan defined by IRC section 401(a). This plan requires mandatory contributions from both the member and employer. SERS invests the contributions to achieve returns to help ensure sufficient funds are available to make required payments to current and future retirees.

Member Contributions

Member contributions were approximately \$405 million for the year ended December 31, 2019, \$394 million for the year ended December 31, 2018, and \$383 million for the year ended December 31, 2017. There was a slight increase in gross salaries, which were approximately \$6.3 billion for 2019 and \$6.1 billion for 2018. The member contribution rate is set by statute and is 6.25% of gross salary for most members.

Employer Contributions

Employer contributions were approximately \$2.1 billion, \$2.0 billion, and \$1.9 billion for the years ended December 31, 2019, 2018, and 2017, respectively. The 2019 contributions represented an increase of \$66 million – or 3% – compared to 2018. The growth was due to salaries increasing as well as a slight increase in the composite employer rate to 33.59% from 32.93% on July 1, 2019. The \$150 million – or 8% – contribution growth in 2018 from 2017 was due to salaries increasing, despite a

slight decrease in the employer rate to 32.93% from 33.24% on July 1, 2018.

Since 2005, Pennsylvania law statutorily suppressed employer contribution rates, primarily through Acts 2003-40 and 2010-120. Act 2010-120 limited the rate at which employer contributions increased in any given year after fiscal year (FY) 2011-12, up to a maximum of 4.5% each year, until rate collars were no longer needed. Under this schedule, commonwealth FY 2017-18 was the first year since legislatively mandated contribution rates were enacted through Act 2010-120 that collars were no longer needed and employers paid the uncollared rate. Since FY 2017-18, employers continued to make contributions to the Defined Benefit Plan at the actuarially required rate. The FY 2020-21 composite employer contribution rate is going to be 33.48% of payroll.

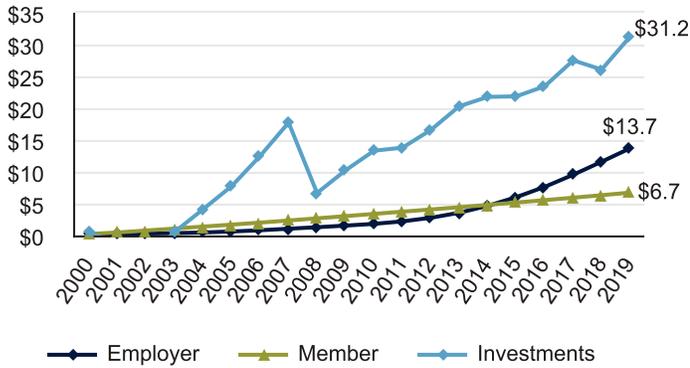
Suppressed employer contributions have provided budgetary relief to commonwealth agencies and the taxpayers of Pennsylvania. The short-term benefit, however, has resulted in the need for employers to contribute more over a 30-year period due to implied financing costs. Such financing costs are incurred because the monies are not presently available to invest and cannot compound.

From 2000 through 2019, employer contributions totaled \$13.7 billion – or 27% – of total additions to fiduciary net position, compared to \$6.7 billion – or 13% – of total additions attributed to member contributions, and \$31.2 billion – or 60% – of total additions attributed to investment earnings, as illustrated in the following charts.

Management’s Discussion and Analysis

December 31, 2019 and 2018 (unaudited)

20-Year Cumulative Additions to Fiduciary Net Position
(\$ billions)



Net Investment Income

SERS utilizes two methodologies when analyzing Defined Benefit Plan investment returns. The two approaches may vary from each other in any given period based on the underlying methodology used. For Governmental Accounting Standards Board (GASB) 67 accounting valuation purposes, a money-weighted return is used. A money-weighted rate of return calculates the investment performance accounting for all cash flows (contributions and withdrawals) occurring during the performance measurement period. Conversely, for investment performance reporting purposes, SERS and its investment consultants rely on a time-weighted approach. A time-weighted rate of return minimizes the impact of cash flows occurring throughout the measurement period. Defined Benefit Plan investment returns, net of manager fees, on a money-weighted

basis, were 18.8%, -4.5%, and 15.1% for the years 2019, 2018, and 2017, respectively. Defined Benefit Plan investment returns, net of manager fees, on a time-weighted basis were 18.8%, -4.6%, and 15.1% for the years 2019, 2018, and 2017, respectively.

Positive investment performance contributed approximately \$5.2 billion to net investment income in 2019, a net investment loss of approximately \$1.4 billion occurred in 2018, and a net positive investment gain of approximately \$4.1 billion occurred in 2017. Strong performance in all asset classes drove overall performance for 2019. In 2018, domestic equities were responsible for a significant portion of the loss.

SERS has reviewed and modified the Defined Benefit Plan’s strategic investment plan, as necessary. The ultimate objective of SERS *2018-2019 Investment Plan* was to formulate an asset allocation policy that provided a high expected probability of achieving its long-term actuarially assumed rate of return. The plan emphasized liquidity, reduction of cash flow volatility, and pursuit of capital protection strategies to ensure that Defined Benefit Plan assets were best positioned to meet the Defined Benefit Plan’s continuing obligations to its beneficiaries.

In December 2019, the SERS Board adopted the *SERS Defined Benefit Plan Investment Policy Statement*. Its purpose is to outline the investment philosophy and practices of SERS and serve as the governing policy for the management of the system’s defined benefit assets. In addition, the board moved to adopt the policy target asset allocation set forth in the new statement. The target asset allocation is projected to achieve SERS’ investment return assumption, reduce investment management fees, and increase liquid assets. The purpose of increasing liquid assets is to maintain a level of funds sufficient to pay retirement benefits and obligations during prolonged periods of market decline and potential budgetary constraints.

SERS’ assets are managed by external investment managers hired by the SERS Board. SERS strives to

FINANCIAL SECTION

Management's Discussion and Analysis

December 31, 2019 and 2018 (unaudited)

engage the highest quality investment managers for the most cost-effective price. Many of these managers are paid a fee based on the amount of assets under management. For private market investments, the industry practice is for the limited partners to pay fees to the general partner based on commitments to the partnership during the investment period.

The Defined Benefit Plan pays the majority of its fees to managers within its Private Equity and Real Estate asset classes due to the complex and time-consuming nature of managing the investments.

Defined Benefit Plan investment expenses, which include fees paid to managers, were \$179 million and \$133 million for the years ended December 31, 2019 and 2018, respectively. The increase was due to more funds charging fees, higher asset based fees because of increased values, and incentive fees.

Benefits, Refunds, and Expenses

Benefit payments to annuitants are the most significant recurring deductions from fiduciary net position. During 2019 and 2018, the SERS Defined Benefit Plan paid out approximately \$3.5 billion and \$3.4 billion in benefits and refunds, respectively.

There were approximately 6,100 new retirees added to the annuity payroll in 2019, with an average annual benefit of \$28,800. There were approximately 5,800 new retirees added to the annuity payroll in 2018, with an average annual benefit of \$28,500. There were more than 4,400 and 4,300 retirees removed from the rolls with an average annual benefit of \$16,300 and \$16,400 in 2019 and 2018, respectively. As is typical in mature pension plans, new retirees in 2019 received a higher annual benefit than those removed from the annuity payroll.

The benefits expense on the Defined Benefit Plan's financial statements consists of two primary components: monthly annuity payments and supplemental payments. Most of the supplemental payments were paid to retiring members who chose to withdraw their contributions and interest at retirement. Such withdrawals reduce the retirees'

annuity payments over their remaining life. Supplemental payments were \$427 million and \$418 million for 2019 and 2018, respectively.

Act 2010-120 lowered the benefits earned by most employees who joined SERS on or after January 1, 2011, through December 31, 2018, by reducing the retirement benefit accrual rate, increasing normal retirement age, extending the vesting period from five years to 10 years, and other provisions. Two other important benefit-related aspects of Act 2010-120 are that retirement provisions for legislators elected after December 1, 2010, were reduced and made consistent with those of most rank-and-file employees. Despite the reduction in benefits, most Act 2010-120 employees continue to contribute 6.25% of their salary and fund a greater proportion of their own retirement benefit.

Act 2017-5 changed the benefits earned by most employees who joined SERS on or after January 1, 2019, whereas a portion of the employee's retirement benefit comes from the Defined Benefit Plan that features guaranteed monthly payments for life based on a calculation. The other portion comes from the Defined Contribution Plan which is based on the employer and employee contributions and the amount of money the employee generates from their investment choices and market performance. Act 2017-5 further reduced the retirement benefit accrual rate and increased the normal retirement age under the Defined Benefit Plan. The accrual rate is determined by the employee's class of service. Employees contribute 5% or 4%, depending on whether they remain in the default class of service, A-5 or elect A-6 class of service, respectively.

It will take considerable time to realize savings from Act 2010-120 and Act 2017-5 as detailed above. SERS expects benefit expenses to rise steadily because the number of retirees added to the rolls is projected to outpace the number of retirees removed from the rolls. Additionally, despite the benefit cost reductions for new employees, the monthly annuities for retirees in the near-term are projected to be

Management's Discussion and Analysis

December 31, 2019 and 2018 (unaudited)

approximately 75% higher than the annuities of those being removed from the payrolls.

SERS was established in 1923, but did not pay more than \$1 billion in annual benefits until 1997. SERS' Defined Benefit Plan annual benefit payments reached \$2 billion in 2007 and \$3 billion in 2015. Based on recent actuarial projections, the SERS Defined Benefit Plan annual benefit payments will reach \$4 billion by 2023.

Growth in Annuity Payroll

	December		
	2019	2018	2017
Monthly annuity payroll (\$ millions)	\$259	\$250	\$242
Retirees	132,731	131,007	129,473

SERS' administrative expenses represented 0.1% of fiduciary net position in 2019 and 2018. All expenses were within budget.

SERS' Assets

Investments are the most significant component of SERS' assets. The total Defined Benefit Plan investment portfolio fair value was \$31.2 billion for 2019, as compared to \$27.2 billion for 2018. The increase in SERS' assets is mostly related to the fact that the net investment income and contributions exceeded benefit payments for the year. SERS reports investments at fair value as discussed in accounting policies note 2(c) to the financial statements. Fair value is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date.

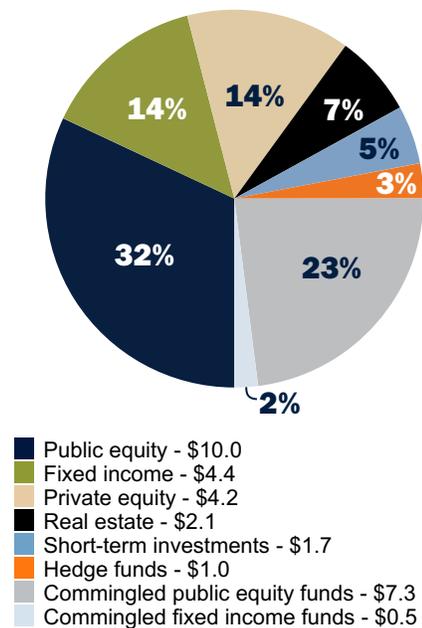
Public equity values increased to \$10.0 billion for 2019, from \$9.4 billion in 2018. Commingled public equity values increased to \$7.3 billion for 2019, from \$5.3 billion in 2018. The increase in equity values and commingled public equity values is attributable to strong broad market returns. Fixed income values increased to \$4.4 billion for 2019, from \$4.0 billion in 2018. Commingled fixed income fund values were approximately \$0.5 billion for 2019 and 2018. The

increase in fixed income values is primarily due to returns. Private equity values increased to \$4.2 billion for 2019, from \$3.9 billion in 2018. Most of the increase in private equity was due to contributions exceeding distributions and strong investment returns. Real estate values increased to \$2.1 billion for 2019, from \$2.0 billion in 2018. Hedge funds values increased to \$1.0 billion for 2019, from \$0.9 billion in 2018. Short-term investments values increased to \$1.7 billion for 2019, from \$1.2 billion in 2018.

The total investment portfolio fair value of \$31.2 billion for 2019 was composed as shown by the chart below:

Investments at Fair Value (2019)

(\$ billions)



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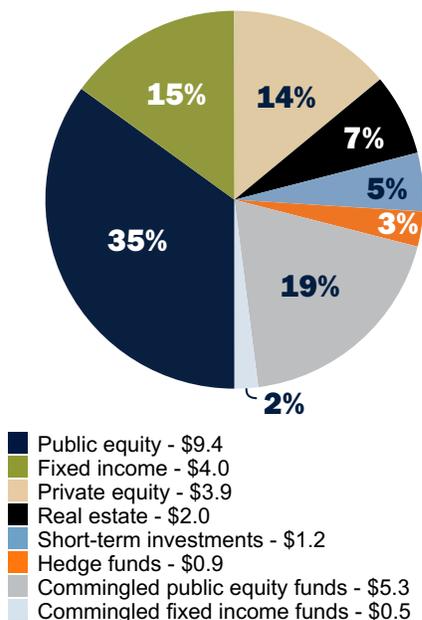
Management's Discussion and Analysis

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The total investment portfolio fair value of \$27.2 billion for 2018 was composed as shown by the chart below:

Investments at Fair Value (2018)

(\$ billions)



SERS earns additional investment income by lending investment securities to brokers. The brokers provide collateral to SERS for borrowed securities generally equal to 102%–105% of the borrowed securities, and SERS invests the collateral to earn interest. Income, net of expenses, from securities lending is dependent on the volume of lending generated at the custodian bank and the spreads (profits) on loaned securities.

SERS' Defined Benefit Plan earned approximately \$40 million through securities lending over the last 10 years. The program's guidelines provide for investment of cash collateral in highly liquid, highly-rated securities.

As of December 31, 2019 and 2018, the fair value of loaned securities was \$687 million and \$274 million, respectively. The fair value of the associated collateral was \$700 million and \$285 million, respectively, of which \$138 million and \$163 million was cash, respectively.

Derivatives

SERS' Defined Benefit Plan permits investment managers to use derivatives to provide market exposure to various asset classes within narrowly prescribed policy guidelines. Used properly, such derivatives cost-efficiently deliver returns similar to indexed returns in the respective asset classes without disrupting Defined Benefit Plan liquidity needs. SERS' Defined Benefit Plan investment managers manage counterparty credit risk by entering into contracts with parties with credit ratings of at least investment grade and by establishing collateral requirements. SERS monitors derivative levels and types to ensure that portfolio derivatives are consistent with their intended purpose and at the appropriate level.

Liquidity

SERS' 2018-2019 Investment Plan used Cash as an asset class that serves as the primary source of short-term liquidity for the Defined Benefit Plan. At December 31, 2019 and 2018, the Defined Benefit Plan held approximately \$1.5 billion and \$0.8 billion in Cash, respectively, which is included in short-term investments on the Statements of Fiduciary Net Position. Specific short-term investments and fixed income holdings also offer liquidity. These investments provide a stable source for meeting the cash flow needs of the plan and protect against the risk that equity investments would need to be liquidated at unfavorable values in order to pay member benefits. Having adequate liquidity levels is especially vital for a mature pension plan that has growing benefit payments that exceed contributions into the plan.

Actuarial Valuations

Annually, the SERS Defined Benefit Plan obtains two actuarial valuations, one for financial reporting purposes under GASB 67 and one that is statutorily required for funding purposes. The funding valuation is used to set the employer contribution rate for the plan.

Management's Discussion and Analysis

December 31, 2019 and 2018 (unaudited)

It is important to note differences in actuarial methods for financial reporting under GASB 67 (accounting valuation) compared to those used for funding purposes (funding valuation). Key differences are shown in the following table:

	GASB 67 - Accounting Valuation	Funding Valuation
Actuarial cost method	Entry age	Variation of entry age
Asset valuation method	Fair (market) value	5-year smoothed market value

Key valuation results for the accounting valuation compared to the funding valuation for the years ended December 31, 2019 and 2018 are as shown in the following tables:

As of December 31, 2019 (\$ millions)

GASB 67 - Accounting Valuation		Funding Valuation	
Total Pension Liability (TPL)	\$49,274	Actuarial Accrued Liability (AAL)	\$52,973
Fiduciary Net Position	31,096	Actuarial Value of Assets	29,934
Net Pension Liability (NPL)	\$18,178	Unfunded AAL	\$23,039
Ratio - Fiduciary Net Position/TPL	63.1%	Funded Ratio	56.5%

As of December 31, 2018 (\$ millions)

GASB 67 - Accounting Valuation		Funding Valuation	
Total Pension Liability (TPL)	\$47,768	Actuarial Accrued Liability (AAL)	\$51,782
Fiduciary Net Position	26,937	Actuarial Value of Assets	28,989
Net Pension Liability (NPL)	\$20,831	Unfunded AAL	\$22,793
Ratio - Fiduciary Net Position/TPL	56.4%	Funded Ratio	56.0%

Under the accounting valuation, the net pension liability decreased to \$18.2 billion in 2019 from \$20.8 billion in 2018. This was due to a \$4.2 billion increase in the fiduciary net position mostly due to investment gains offset by benefit payments exceeding contributions. The increase in net position was offset by a \$1.5 billion increase in the total pension liability mostly due to differences between expected and actual experience, and changes of assumptions from reducing the investment rate of return to 7.125% from 7.25%. Under the funding valuation, the unfunded actuarial accrued liability increased slightly to \$23.0 billion in 2019 from \$22.8 billion in 2018 due mostly to the same factors as discussed above, except the effect of current year investment income being not as impactful because of asset smoothing.

The unfunded actuarial accrued liability under the funding valuation was \$4.9 billion and \$2.0 billion higher than the net pension liability under the accounting valuation in 2019 and 2018, respectively. The more favorable result under the accounting valuation can be specifically attributed to the actuarial cost method required under GASB 67. The entry-age actuarial cost method apportioned more of the pension costs of certain members to the normal cost and therefore lowered the amount apportioned to the unfunded liability. In 2019, the benefit from using the actuarial cost method was compounded by the fact that current year investment earnings were recognized immediately in the fiduciary net position balance as opposed to being deferred and smoothed into assets over five years under the funding valuation. In 2018, the benefit from using the actuarial cost method was

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offset by the fact that investment losses were recognized immediately in the fiduciary net position balance as opposed to being deferred and smoothed into assets over five years under the funding valuation.

Every five years, the SERS Defined Benefit Plan is required to conduct an actuarial experience study to determine whether the assumptions used in its annual actuarial valuations remain accurate based on current and anticipated demographic trends and economic conditions. The *18th Investigation of Actuarial Experience* study for the period 2011-2015 was released in March 2016. The actuary, under oversight of the SERS Board, reviewed economic assumptions (such as the assumed future investment returns and salary increases) as well as demographic assumptions (such as employee turnover, retirement, disability, and death rates). Some assumption adjustments increased projected cost and some decreased projected cost, but the overall result was a slight increase to the net position liability.

Most demographic assumptions remained the same as, or similar to, experience over the last five years. However, the experience study did recommend changing some assumptions. The study recommended decreasing disability retirement rates for all active members. Additionally, it recommended adjusting superannuation separation rates, early retirement separation rates, and withdrawal rates for certain active member groupings (gender, age, and years of service) in both the general and special membership classes. Furthermore, it recommended decreasing most annuitant and survivor mortality rates.

The SERS Board adopted the actuarial assumptions set forth in the *18th Investigation of Actuarial Experience* at its March 2016 meeting. The study can be viewed at www.SERS.pa.gov.

In addition to the five-year experience study, the SERS Board reviews the Defined Benefit Plan's investment return assumption in light of economic conditions every year. In June 2019, the SERS Board approved a reduction in the Defined Benefit Plan

investment rate of return assumption to 7.125% for 2019 from 7.25% for 2018.

The Defined Contribution Plan

On June 12, 2017, Governor Wolf signed Act 2017-5 into law. The law established two new side-by-side hybrid defined benefit/defined contribution benefit options and a new defined contribution-only option for all state employees, excluding most hazardous duty employees, who first enter SERS membership on or after January 1, 2019. Additionally, all legacy SERS members had a one time, irrevocable option to select one of the three new retirement benefit options.

While new employees are automatically enrolled in the hybrid Defined Benefit/Defined Contribution Plan A-5 class of service, they have the option to elect the other hybrid Defined Benefit/Defined Contribution Plan option A-6 class of service, or to join the stand-alone Defined Contribution Plan. The Defined Contribution Plan, for all options, has three-year vesting for employer contributions and immediate vesting for employee contributions.

The SERS Board selects the investment options offered through the Defined Contribution Plan, and contracts with investment managers and with a third-party administrator (TPA) for the plan. The employee defined contribution accounts are maintained by the TPA. Employee and employer contributions for the Defined Contribution Plan are deposited into participants' individual investment accounts. Employees may invest their money in several investment options including a range of target date funds, equity funds, fixed income funds, a short-term investment fund, and self-directed brokerage option. If no active selection is made, contributions will be defaulted into one of the target date funds. The benefit to which a participant is entitled to is their vested account balance at termination. Distribution of benefits can be made in installments, lump sum payments, or through an annuity.

There were approximately 8,000 defined contribution accounts established in 2019. The net position of the Defined Contribution Plan as of December 31, 2019,

Management's Discussion and Analysis

December 31, 2019 and 2018 (unaudited)

was approximately \$12.4 million. The plan received approximately \$6.1 million in employee contributions and \$2.8 million in employer contributions in 2019. The employees in the plan received net investment income totaling approximately \$673,000 and the plan distributed approximately \$72,000 in benefits and refunds for calendar year ended December 31, 2019.

The fees, costs, and expenses of administering this plan are to be paid by the participants, except as the General Assembly may provide. These costs are currently paid by the commonwealth and there is no administrative charge to participants. \$3.9 million and \$4.9 million was received in 2019 and 2018, respectively. Combined, these funds helped to pay expenses totaling approximately \$5.2 million and \$0.7 million for the years ended December 31, 2019 and 2018, respectively.

Pennsylvania Act 2019-105

Governor Wolf signed House Bill 1982 into law as Act 2019-105 on November 27, 2019. The law allows eligible employers to enter into an agreement with the SERS Board to make a one-time lump sum payment of 75% to 100% of their respective unfunded accrued liability. SERS' actuaries will make the calculation of the portion of the unfunded accrued liability that an eligible employer is liable for based on SERS' most recent valuation report. The eligible employer will receive credit against future actuarially determined contributions on a periodic basis that coincide with its existing schedule for making employer contributions to the system. With limited exceptions, this schedule is fixed once it is set. The lump sum payment covers only liabilities accrued as of the date of the calculation. Future changes in liability, whether gains or losses, will attach to the employer as if the advance payment was not made. Agreements must be entered into by December 31, 2024, and the lump sum payments must be made by May 1, 2025.

Condensed Financial Information

(\$ millions)

Fiduciary Net Position

	2019	Increase/ (Decrease)	2018	Increase/ (Decrease)	2017
Total investments	\$31,211	\$4,012	\$27,199	(\$2,502)	\$29,701
Net other assets, liabilities, and deferrals	(102)	156	(258)	38	(296)
Net position restricted for pensions and held in trust for defined contribution plan participants	\$31,109	\$4,168	\$26,941	(\$2,464)	\$29,405

Changes in Fiduciary Net Position

	2019	Increase/ (Decrease)	2018	Increase/ (Decrease)	2017
Contributions	\$2,529	\$86	\$2,443	\$162	\$2,281
Commonwealth funding	4	(1)	5	5	—
Net investment income/(loss)	5,176	6,618	(1,442)	(5,508)	4,066
Benefit, refunds, and administrative expenses	3,541	119	3,422	92	3,330
Cumulative effect of change in accounting principle	—	48	(48)	(48)	—
Net increase/(decrease) in net position restricted for pensions and held in trust for defined contribution plan participants	\$4,168	\$6,632	(\$2,464)	(\$5,481)	\$3,017

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Statements of Fiduciary Net Position

Statement of Fiduciary Net Position

December 31, 2019

(\$ thousands)

	Defined Benefit Plan	Defined Contribution Plan	Total
Assets			
Receivables			
Plan members	\$1,393	\$—	\$1,393
Employers	104,922	—	104,922
Investment income	63,855	7	63,862
Investment proceeds and other receivables	247,834	—	247,834
Miscellaneous	3,198	50	3,248
Total receivables	421,202	57	421,259
Investments			
Short-term investments	1,661,979	4,434	1,666,413
Fixed income	4,386,907	—	4,386,907
Common and preferred stocks	10,003,701	—	10,003,701
Hedge funds	1,005,418	—	1,005,418
Real estate	2,114,407	—	2,114,407
Private equity	4,193,050	—	4,193,050
Target date funds	—	7,898	7,898
Commingled public equity funds	7,269,266	808	7,270,074
Commingled fixed income funds	559,587	150	559,737
Other investments	3,021	—	3,021
Total investments	31,197,336	13,290	31,210,626
Securities lending collateral pool	137,604	—	137,604
Total assets	31,756,142	13,347	31,769,489
Total deferred outflows - OPEB	3,122	667	3,789
Total assets and deferred outflows	31,759,264	14,014	31,773,278
Liabilities			
Accounts payable and accrued expenses	52,995	882	53,877
Investment purchases and other liabilities	427,464	28	427,492
Obligations under securities lending	137,604	—	137,604
Net OPEB liability	23,229	375	23,604
Total liabilities	641,292	1,285	642,577
Total deferred inflows - OPEB	21,653	332	21,985
Total liabilities and deferred inflows	662,945	1,617	664,562
Net position restricted for pensions and held in trust for defined contribution plan participants	\$31,096,319	\$12,397	\$31,108,716

See accompanying notes to financial statements.

Statements of Fiduciary Net Position

Statement of Fiduciary Net Position

December 31, 2018

(\$ thousands)

	Defined Benefit Plan	Defined Contribution Plan	Total
Assets			
Receivables			
Plan members	\$697	\$—	\$697
Employers	109,491	—	109,491
Investment income	62,415	—	62,415
Investment proceeds and other receivables	58,136	—	58,136
Miscellaneous	4,176	—	4,176
Total receivables	234,915	—	234,915
Investments			
Short-term investments	1,145,805	4,460	1,150,265
Fixed income	4,012,460	—	4,012,460
Common and preferred stocks	9,381,337	—	9,381,337
Hedge funds	921,498	—	921,498
Real estate	1,967,097	—	1,967,097
Private equity	3,899,599	—	3,899,599
Commingled public equity funds	5,345,989	—	5,345,989
Commingled fixed income funds	521,474	—	521,474
Other investments	(420)	—	(420)
Total investments	27,194,839	4,460	27,199,299
Securities lending collateral pool	163,955	—	163,955
Total assets	27,593,709	4,460	27,598,169
Total deferred outflows - OPEB	646	—	646
Total assets and deferred outflows	27,594,355	4,460	27,598,815
Liabilities			
Accounts payable and accrued expenses	48,988	291	49,279
Investment purchases and other liabilities	398,069	—	398,069
Obligations under securities lending	163,955	—	163,955
Net OPEB liability	31,221	—	31,221
Total liabilities	642,233	291	642,524
Total deferred inflows - OPEB	15,132	—	15,132
Total liabilities and deferred inflows	657,365	291	657,656
Net position restricted for pensions and held in trust for defined contribution plan participants	\$26,936,990	\$4,169	\$26,941,159

See accompanying notes to financial statements.

FINANCIAL SECTION

Statements of Changes in Fiduciary Net Position

Statement of Changes in Fiduciary Net Position

Year Ended December 31, 2019

(\$ thousands)

	Defined Benefit Plan	Defined Contribution Plan	Total
Additions			
Contributions			
Plan members/participants	\$404,769	\$6,124	\$410,893
Employers	2,114,882	2,836	2,117,718
Total contributions	2,519,651	8,960	2,528,611
Commonwealth funding	—	3,852	3,852
Investment income			
From investing activities			
Net appreciation in fair value of investments	4,901,079	578	4,901,657
Interest	162,152	97	162,249
Dividends	182,853	—	182,853
Real estate income	101,283	—	101,283
Miscellaneous income	5,269	—	5,269
Total investing activities income	5,352,636	675	5,353,311
Investment expenses	(179,344)	(2)	(179,346)
Net income from investing activities	5,173,292	673	5,173,965
From securities lending activities			
Securities lending income	2,587	—	2,587
Securities lending expenses	(255)	—	(255)
Net income from securities lending activities	2,332	—	2,332
Net investment income	5,175,624	673	5,176,297
Total additions	7,695,275	13,485	7,708,760
Deductions			
Benefits	3,490,311	52	3,490,363
Refunds of contributions	22,360	20	22,380
Administrative expenses	23,275	5,185	28,460
Total deductions	3,535,946	5,257	3,541,203
Net increase	4,159,329	8,228	4,167,557
Net position restricted for pensions and held in trust for defined contribution plan participants			
Balance, beginning of year	26,936,990	4,169	26,941,159
Balance, end of year	\$31,096,319	\$12,397	\$31,108,716

See accompanying notes to financial statements.

Statements of Changes in Fiduciary Net Position

Statement of Changes in Fiduciary Net Position

Year Ended December 31, 2018

(\$ thousands)

	Defined Benefit Plan	Defined Contribution Plan	Total
Additions			
Contributions			
Plan members	\$393,925	\$—	\$393,925
Employers	2,048,594	—	2,048,594
Total contributions	2,442,519	—	2,442,519
Commonwealth funding	—	4,901	4,901
Investment income			
From investing activities			
Net depreciation in fair value of investments	(1,733,999)	—	(1,733,999)
Interest	142,918	—	142,918
Dividends	203,533	—	203,533
Real estate income	74,115	—	74,115
Miscellaneous income	889	—	889
Total investing activities loss	(1,312,544)	—	(1,312,544)
Investment expenses	(133,146)	—	(133,146)
Net loss from investing activities	(1,445,690)	—	(1,445,690)
From securities lending activities			
Securities lending income	3,771	—	3,771
Securities lending expenses	(372)	—	(372)
Net income from securities lending activities	3,399	—	3,399
Net investment loss	(1,442,291)	—	(1,442,291)
Total additions	1,000,228	4,901	1,005,129
Deductions			
Benefits	3,375,394	—	3,375,394
Refunds of contributions	19,242	—	19,242
Administrative expenses	25,950	732	26,682
Total deductions	3,420,586	732	3,421,318
Net (decrease)/increase	(2,420,358)	4,169	(2,416,189)
Net position restricted for pensions and held in trust for defined contribution plan participants			
Balance, beginning of year	29,405,042	—	29,405,042
Cumulative effect of change in accounting principle	(47,694)	—	(47,694)
Balance, beginning of year, as restated	29,357,348	—	29,357,348
Balance, end of year	\$26,936,990	\$4,169	\$26,941,159

See accompanying notes to financial statements.

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Notes to Financial Statements

December 31, 2019 and 2018

(1) Organization and Description of Pennsylvania State Employees' Retirement System (SERS)

(a) Organization

SERS was established as of June 27, 1923, under the provisions of Public Law 858, No. 331. SERS was developed as an independent administrative agency of the board, which exercises control and management of SERS, including the investment of its assets. The SERS Board has 11 members including the State Treasurer (ex officio), the Secretary of Banking and Securities (ex officio), two Senators, two members of the House of Representatives, and five members appointed by the Governor, one of whom is an annuitant of SERS. At least five board members must be active members of SERS and at least two must have 10 or more years of credited service.

SERS is the administrator of the State Employees' Retirement Fund (Defined Benefit Plan or pension plan), which is a cost-sharing multiple employer defined benefit pension plan. SERS is also the administrator of the State Employees' Defined Contribution Plan, which was established as part of Act 2017-5. The Defined Contribution Plan opened for enrollment on January 1, 2019. Both the Defined Benefit Plan and Defined Contribution Plan were established by the Commonwealth of Pennsylvania (commonwealth) to provide retirement benefits for employees of state government and certain independent agencies. The Defined Benefit and Defined Contribution Plans operate under separate trusts.

SERS is a component unit of the commonwealth, and the Defined Benefit and Defined Contribution Plans are included in the commonwealth's financial report as pension trust funds.

Membership in SERS is mandatory for most state employees. Members and employees of the General Assembly, certain elected or appointed officials in the executive branch, department heads, and certain employees in the field of education are not required but are given the option to participate. The Defined

Benefit Plan membership includes 38 employers with the commonwealth being classified as its largest employer. The commonwealth comprises 65 agencies and when everything is evaluated separately, the Defined Benefit Plan has a total of 102 participating employers/agencies. The Defined Contribution Plan membership includes 18 employers and the commonwealth is classified as its largest employer. The commonwealth comprises 54 agencies and when everything is evaluated separately, the Defined Contribution Plan has a total of 71 participating employers/agencies. Additional employers/agencies will join the Defined Contribution Plan as they hire employees who are mandated to be in the plan. At December 31, 2019 and 2018, SERS' membership consisted of the following:

SERS Membership

	2019	2018
Defined Benefit Plan		
Inactive plan members or beneficiaries currently receiving benefits	132,731	131,007
Inactive plan members entitled to but not yet receiving benefits	6,752	7,030
Active plan members	102,850	103,007
Total members	242,333	241,044
Defined Contribution Plan		
Inactive accounts	864	NA
Active participants contributing to plan	6,938	NA
Total participants	7,802	

As a result of the hybrid benefit structure established by Act 2017-5, certain employees may be included in both the defined benefit and defined contribution figures above.

(b) Defined Benefit Plan Benefits

The SERS Defined Benefit Plan provides retirement, death, and disability benefits. Cost of Living Adjustments (COLA) are provided ad hoc at the discretion of the General Assembly. Article II of the

Notes to Financial Statements

December 31, 2019 and 2018

Commonwealth of Pennsylvania's Constitution assigns the authority to establish and amend the benefit provisions of the pension plan to the General Assembly. Member retirement benefits are determined by taking years of credited service multiplied by the final average salary multiplied by the annual accrual rate.

Most employees who entered SERS membership prior to January 1, 2011, and who retire at age 60 with three years of service, or at any age with 35 years of service, are entitled to a full retirement benefit. Members of the General Assembly and certain employees classified in hazardous duty positions can retire with full benefits at age 50, with at least three years of service. Act 2010-120 preserved all benefits in place for members but mandated a number of benefit reductions for new members effective January 1, 2011, through December 31, 2018. The Act created a class of service in which members earn a benefit that accrues at 2% of the member's final average salary instead of 2.5% each year and vests in 10 years instead of five. The full retirement age is 65 for most employees who entered SERS membership after January 1, 2011, and age 55 for members of the General Assembly and certain employees classified in hazardous duty positions. Act 2017-5 changed the benefit structure for most new employees effective January 1, 2019, which created two hybrid plan options as well as a defined contribution-only plan option. The two hybrid plan options contain a Defined Benefit Plan component with a full retirement age of 67 that accrues at 1.25% or 1% of the member's final average salary.

Most members of SERS, and all state employees hired after June 30, 2001, and prior to January 1, 2011 (except state police officers and certain members of the judiciary and legislators), are Class AA members. Each class of benefits is based on a multiple of the base accrual rate of 2%, which is called the multiplier. The multiplier for Class AA is 1.25, which translates into an annual benefit of 2.5% of the member's highest three-year average salary multiplied by years of service and became effective

for members July 1, 2001. The general annual benefit for Class A members is 2% of the member's highest three-year average salary multiplied by years of service.

State police are entitled to a benefit equal to a percentage of their highest annual salary, excluding their year of retirement. The benefit is 75% of salary for 25 or more years of service and 50% of salary for 20–24.99 years of service. Judges are entitled to a benefit of 4% of final average salary for each of the first 10 years of service and 3% for subsequent years. Magisterial District Judges are entitled to a benefit of 3% of final average salary for each year of service. Legislators taking office before December 1, 2010, are Class D-4. The multiplier for Class D-4 is 1.5, which translates into an annual benefit of 3% of the final average salary for each year of service.

Act 2010-120 created an A-3 class of service and an optional A-4 class for most employees who enter SERS membership for the first time on or after January 1, 2011, and December 1, 2010, for legislators newly elected in November 2010, through December 31, 2018. On or after January 1, 2019, class A-3 is only offered to hazardous duty employees. Employees who enter SERS membership under Act 2010-120 enter as members of the A-3 class with a 45-day window to elect membership in the optional A-4 class. The general annual benefit for Class A-3 members is 2% of the member's highest three-year average salary multiplied by years of service, while the Class A-4 benefit accrual rate is 2.5%.

Act 2017-5 created a new A-5 hybrid class of service with optional hybrid A-6 class and straight defined contribution-only plan options for state employees (excluding most hazardous duty employees), who first enter SERS membership on or after January 1, 2019. Employees who enter SERS membership under Act 2017-5 enter as members of the A-5 class with a 45-day window to elect membership in the optional A-6 class or straight Defined Contribution Plan. The general annual benefit for Class A-5 members is 1.25% of an average of the highest five calendar

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Notes to Financial Statements

December 31, 2019 and 2018

years of the member's salary multiplied by years of service, while the Class A-6 benefit accrual rate is 1%. Those members choosing the straight Defined Contribution Plan do not have a benefit accrual rate and retire with their contributions, employer contributions if vested, and any investment gains on those contributions.

According to the State Employees' Retirement Code (retirement code), all obligations of SERS will be assumed by the commonwealth should SERS terminate.

(c) Defined Benefit Plan Contributions

SERS retirement code (71 Pa. C.S.) requires that all SERS participating employers make contributions to the pension plan on behalf of all active members and annuitants necessary to fund the liabilities and provide the annuity reserves required to pay benefits. The SERS Defined Benefit Plan funding policy, as set by the board, provides for periodic active member contributions at statutory rates. The Defined Benefit Plan funding policy also provides for periodic employer contributions at actuarially determined rates based on the Defined Benefit Plan funding valuation, expressed as a percentage of annual retirement covered payroll, such that they, along with employee contributions and an actuarially determined rate of investment return, are adequate to accumulate assets to pay benefits when due. In fiscal year (FY) 2017-18, the commonwealth paid the full actuarially required rate after being collared in previous years due to Act 2010-120. At December 31, 2019 and 2018, the actuarially determined rate was 33.59% and 32.93%, respectively. Act 2017-5 includes a savings "plow-back" provision requiring that the annual savings achieved through SERS' benefit changes flow back into the Defined Benefit Plan through the employer contribution rate rather than to other non-pension obligations.

Employer rates are computed based on SERS' fiscal year end of December 31 and applied to the commonwealth based on its fiscal year end of June 30; therefore, the employer contribution rates, in effect for SERS' full year ended December 31, reflect

a blended average of calculated rates. As of December 31, 2019 and 2018, the blended contribution rates were 33.26% and 33.09%, respectively.

The general membership contribution rate for all Class A and Class AA members is 5% and 6.25% of salary, respectively. The general membership contribution rate under Act 2010-120 for A-3 and A-4 members is 6.25% and 9.3% of salary, respectively. The general membership contribution rate under Act 2017-5 for A-5 and A-6 members is 5% and 4% of salary, respectively. The contribution rate for Class D-4 Members of the General Assembly is 7.5%. Judges and Magisterial District Judges have the option of electing special membership classes requiring a contribution of 10% and 7.5%, respectively. All Defined Benefit Plan employee contributions are recorded in individually identified accounts that are credited with interest, calculated at 4% per annum, as mandated by statute. Accumulated employee contributions and credited interest vest immediately and are returned to the employee upon termination of service if the employee is not eligible for other benefits or elects to waive their benefits.

(d) Defined Contribution Plan

The SERS retirement code requires that all SERS participating employers make contributions to the Defined Contribution Plan on behalf of all active participants. SERS' funding policy, as set by the SERS Board, provides for periodic employer and active participant contributions at statutory rates.

Participants in the A-5 class, A-6 class, and defined contribution-only plan option contribute 3.25%, 3.5%, and 7.5% to the plan, respectively. Participants may also make additional voluntary contributions to the plan. Employers contribute 2.25%, 2.00%, and 3.50% for participants in the A-5 class, A-6 class, and defined contribution-only plan option, respectively. Employers are not required to match participant voluntary contributions to the plan. Participants are also permitted to transfer or roll over monies into the plan from other qualified plans.

While participant contributions are immediately vested, the employer contributions are not vested until a participant earns three eligibility points. Eligibility points are generally credited based on hours worked in a calendar year.

If a participant terminates employment before earning three eligibility points, any unvested employer contributions are returned to the employees' most recent employer to be used to offset future employer contributions to the plan. These monies are kept in employer-level forfeiture accounts with the third-party administrator (TPA). During the year ended Dec. 31, 2019, employer contributions were reduced by \$30,000. There were \$210,000 in forfeitures available for future use as of the end of the year.

Each participant in the Defined Contribution Plan holds an individual account with the plan's TPA. The TPA is paid a fee for administering the plan. This fee, and other administrative fees incurred by the plan are currently being paid by the commonwealth.

Participant accounts are credited with the participant's contributions as well as their employer's contributions and are adjusted for the investment earnings and investment management expenses associated with the investment options chosen by the participant. Participants can choose to invest their money in any of several investment options including a range of target date funds, equity funds, fixed income funds, a short-term investment fund, and a self-directed brokerage option. The benefit to which a participant is entitled to is their vested account balance at termination. Distribution of benefits can be made in installments, lump sum payments, or through an annuity. Participants are also permitted to transfer or roll over monies out of the plan into other qualified plans.

(2) Summary of Significant Accounting Policies

(a) Basis of Accounting

SERS' financial statements are prepared using the accrual basis of accounting and economic resources measurement focus. Plan member contributions are recognized in the period in which the contributions are due. Employer contributions are recognized when due and the employer has a legal requirement to provide the contributions. Benefits, disbursements, and refunds are recognized when due and payable in accordance with the terms of the plans. Investment purchases and sales are recorded on a trade-date basis.

(b) Use of Estimates

Management of SERS has made certain estimates and assumptions relating to the reporting of assets and liabilities, and the disclosure of contingent assets and liabilities to prepare these financial statements in conformity with U.S. generally accepted accounting principles. Actual results could differ from those estimates.

(c) Valuation of Investments

SERS investments are reported at fair value. Fair value is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. U.S. government securities and corporate and foreign bonds and notes are valued based on matrix pricing. Commingled public equity funds and common and preferred stocks are generally valued based on published market prices and quotations at the close of business from national security exchanges and securities pricing services. Private equity, real estate, hedge funds, target date funds, and commingled fixed income funds are reported at fair value as estimated and reported by general partners, based upon the underlying net asset value (NAV) of the fund or partnership as a practical expedient of fair value. Adjustments are required when SERS expects to sell the investment at a value other than NAV.

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The investments in short-term investment funds, including those managed by the treasurer of the commonwealth, are reported at cost plus allocated interest, which approximates fair value. The securities lending collateral pool, which is a fund operated by the securities lending agent is also accounted for at cost plus accrued interest, which approximates fair value.

Unsettled investment sales are reported as investment proceeds receivable and unsettled investment purchases are reported as investment purchases payable. Investment expenses consist of investment managers' fees and those expenses directly related to SERS investment operations.

(d) Commitments

As of December 31, 2019 and 2018, SERS' Defined Benefit Plan had contractual commitments totaling approximately \$4.8 billion and \$3.6 billion, respectively, to fund future private equity and real estate investments over the next several years.

(e) Federal Income Taxes

The Internal Revenue Service (IRS) issued a favorable tax determination letter on May 19, 2017, qualifying the Defined Benefit Plan as a Governmental Plan under the Internal Revenue Code (IRC). Therefore, SERS is exempt from federal income taxes.

(f) Risk Management

SERS is exposed to various liabilities and risks of loss related to theft or destruction of assets, injuries to employees, and court challenges to fiduciary decisions. SERS is accorded sovereign immunity as an administrative agency of the commonwealth. SERS participates in certain commonwealth pooled insurance programs and requires asset managers to carry certain insurance coverage. SERS is self-insured for fiduciary, director, and officer liability. During the past three fiscal years, SERS insurance settlements did not exceed insurance coverage.

(g) Interfund Transactions

Interfund transfers of assets take place on a regular basis between the Defined Benefit Plan and Defined Contribution Plan. Interfund activity is used to properly align expenses with each plan.

(h) Adopted Accounting Pronouncements

SERS implemented the requirements of Governmental Accounting Standards Board (GASB) Statement No. 75, *Accounting and Financial Reporting for Postemployment Benefits Other Than Pensions (OPEB)* (GASB 75). GASB 75 replaces GASB 45, *Accounting and Financial Reporting by Employers for Postemployment Benefits Other Than Pensions*, as amended, and GASB 57, *OPEB Measurements by Agent Employers and Agent Multiple-Employer Plans*, for OPEB. GASB specifies the required approach to measuring the OPEB liability for employers for benefits provided through the commonwealth Retired Employees Health Program (REHP). This required SERS to record its proportionate share of net OPEB liability, as of a determined date, and restate its net position restricted for pensions as of January 1, 2018. Please see note 7 for further information.

(3) Legally Required Reserves

The retirement code requires the maintenance of the following reserve accounts representing the net position held for future and current benefit payments.

The **Members' Savings Account** accumulates contributions and interest earnings of active employees. Member balances are transferred to the Annuity Reserve Accounts as members retire.

The **State Accumulation Account** accumulates contributions of the employer and the net earnings of the pension plan. Funds are transferred to the Annuity Reserve Accounts as members retire. The amount transferred is actuarially determined. Negative balances represent the amounts transferred to other reserve account balances in excess of accumulated employer contributions and net earnings.

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The **Directed Commissions Reserve Account** accumulates the income from the commission recapture program less any administrative expenses. SERS utilizes brokers to rebate a percentage of trade commissions directly to SERS. During the years ended December 31, 2019 and 2018, SERS earned approximately \$106,000 and \$158,000 of income resulting from the commission recapture program, respectively. During 2019 and 2018, no administrative expenditures were made from the program. At December 31, 2019 and 2018, SERS had accumulated commission reserves of \$3.6 million and \$3.4 million, respectively. These commission reserves can be used to pay for future administrative expenditures.

The **Annuity Reserve Accounts** are the accounts from which all death and retirement benefits and supplemental annuities are paid. The balances in these accounts are actuarially determined.

The **Interest Reserve Account** accumulates all income earned by the pension plan. In addition, all administrative and investment expenses incurred by the pension plan and the board necessary for the operation of SERS are paid from this account. Any balance in this reserve is transferred to the State Accumulation Account at year end.

The **Benefits Completion Plan (BCP) Reserve Account** accumulates all BCP employer contributions and net earnings of the pension plan less any benefits paid out of the pension plan. Act 2002-234 amended the retirement code that directs the SERS Board to establish and serve as trustee of a retirement benefit plan that is in conformity with IRC Section 415(m), the BCP. The BCP is a separate trust fund established to provide benefits to all annuitants of SERS' Defined Benefit Plan and their survivor annuitants and beneficiaries whose retirement benefit exceeds the IRC Section 415(b) limits. A monthly annuity or death benefit is paid under the BCP only if a corresponding monthly annuity or death benefit is paid from the Defined Benefit Plan to the extent permitted by IRC Section 415(b) and the retirement code. There were 25 and 32 individuals receiving

benefits from the BCP at December 31, 2019 and 2018, respectively.

Account balances at December 31, 2019 and 2018 are as follows:

Account Balances

(\$ thousands)

	2019	2018
Members' savings account	\$5,183,195	\$5,074,760
State accumulation and interest reserve accounts	(3,745,634)	(6,701,765)
Directed commissions reserve account	3,561	3,455
Annuity reserve accounts		
Annuitants and beneficiaries	26,421,596	25,465,859
State police	3,183,524	3,044,953
Enforcement officers	46,423	47,471
Benefit completion plan reserve account	3,654	2,257
Total	\$31,096,319	\$26,936,990

The **State Employees' Defined Contribution Trust** accumulates Defined Contribution Plan participant and employer contributions, investment earnings, and plan expenses. The trust is comprised of individual participant investment accounts and commonwealth funding received to cover plan startup costs. The assets of the plan are held in trust for the exclusive benefit of the participants and their beneficiaries and may be used for the payment of the fees, costs, and expenses related to the administration of the plan. Currently, all fees, costs, and expenses of administering the plan are being covered by the commonwealth.

(4) Investments

As provided by statute, the SERS Board has exclusive control and management responsibility of the Defined Benefit Plan and the Defined Contribution Plan with full power to invest for each plan. In exercising its fiduciary responsibility to SERS' collective membership, the SERS Board is governed by the prudent investor rule in establishing investment policy. The prudent investor rule requires the exercise of that degree of judgment, skill, and

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care under the circumstances then prevailing which investors of prudence, discretion, and intelligence, who are familiar with such matters, exercise in the management of their own affairs, not in regard to speculation, but in regard to permanent disposition of the funds, considering the probable income to be derived there from, as well as the probable safety of their capital. The SERS Board has adopted *SERS' Defined Benefit Plan Investment Policy Statement* and the *401(a) Defined Contribution Plan Statement of Investment Policy* to formally document investment objectives and responsibilities. These policies, as well as applicable state law, establishes guidelines for permissible investments of SERS.

Fair Value Hierarchy

The fair value hierarchy is broken down into three levels based on inputs that market participants would use in valuing assets and liabilities derived from market data as follows:

- **Level 1 inputs:** are quoted prices in active markets for identical assets or liabilities.
- **Level 2 inputs:** are quoted prices for similar assets or liabilities in active markets, quoted prices for identical or similar assets or liabilities in markets that are not active, or other than quoted prices that are observable.

- **Level 3 inputs:** are unobservable inputs used to measure fair value if relevant observable inputs are not available for the asset or liability at the reporting date.

Common and preferred stocks, commingled public equity funds, real estate securities, and foreign exchange contracts are valued using prices quoted in active markets for those securities and are categorized as Level 1. They are marked to market daily with changes in fair value recognized as part of investments and investment income. Fixed income securities are valued using a matrix pricing technique and are categorized as Level 2. Matrix pricing is used to value securities based on the securities' relationship to benchmark quoted prices and recently printed security specific trading levels. Value add/opportunistic separately managed accounts (SMA) in real estate and other securities classified in Level 3 reflect prices, which may use several unobservable inputs using assumptions based on market methodologies to determine the fair value of investments.

Derivative instruments, which include foreign exchange contracts, interest rate swaps, credit default swaps, and futures, are included in other investments in the fair value tables.

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At December 31, 2019 and 2018, the Defined Benefit Plan's investments measured at fair value are shown in the following tables:

Defined Benefit Plan Investments Measured at Fair Value (2019)

(\$ thousands)

	Fair Value	Level 1	Level 2	Level 3
Fixed income				
Government	\$2,104,363	\$—	\$2,104,363	\$—
Corporates	827,058	—	803,453	23,605
Asset- and mortgage-backed securities	626,387	—	625,542	845
Private placements	573,206	—	560,237	12,969
Sovereign debt	231,729	—	231,729	—
Agencies	22,680	—	22,680	—
Total fixed income	4,385,423	—	4,348,004	37,419
Equity				
Domestic common and preferred stocks	8,578,161	8,570,438	7,723	—
Commingled public equity funds	7,269,266	7,269,266	—	—
Foreign common and preferred stocks	1,425,333	1,425,333	—	—
Total equity	17,272,760	17,265,037	7,723	—
Real estate				
Value add/opportunistic SMA	638,849	—	—	638,849
Real estate securities	280,751	280,751	—	—
Total real estate	919,600	280,751	—	638,849
Other investments				
Other investments	3,019	1,839	1,180	—
Total	\$22,580,802	\$17,547,627	\$4,356,907	\$676,268

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Defined Benefit Plan Investments Measured at Fair Value (2018)

(\$ thousands)

	Fair Value	Level 1	Level 2	Level 3
Fixed income				
Government	\$1,835,364	\$—	\$1,835,364	\$—
Corporates	765,602	—	738,860	26,742
Asset- and mortgage-backed securities	673,339	—	672,623	716
Private placements	451,575	—	440,317	11,258
Sovereign debt	234,120	—	234,120	—
Agencies	51,666	—	51,666	—
Total fixed income	4,011,666	—	3,972,950	38,716
Equity				
Domestic common and preferred stocks	7,655,607	7,649,738	5,869	—
Commingled public equity funds	5,345,989	5,345,989	—	—
Foreign common and preferred stocks	1,725,585	1,725,585	—	—
Total equity	14,727,181	14,721,312	5,869	—
Real estate				
Value add/opportunistic SMA	746,256	—	—	746,256
Real estate securities	221,138	221,138	—	—
Total real estate	967,394	221,138	—	746,256
Other investments				
Other investments	(422)	(183)	(305)	66
Total	\$19,705,819	\$14,942,267	\$3,978,514	\$785,038

At December 31, 2019, the Defined Contribution Plan's investments measured at fair value are shown in the following table:

Defined Contribution Plan Investments Measured at Fair Value (2019)

(\$ thousands)

	Fair Value	Level 1	Level 2	Level 3
Commingled public equity funds				
Commingled public equity funds	\$808	\$808	\$—	\$—
Total	\$808	\$808	\$—	\$—

Private equity limited partnerships are valued at the NAV of SERS' ownership interest in partners' capital, which approximates fair value. NAV is determined by the general partners using assumptions and estimates that have been reviewed and approved by valuation committees. Private equity limited partnerships are audited annually. Since private equity investments in such partnerships are generally illiquid with holding periods lasting seven to 10 years, the value realized by SERS upon disposition may differ from estimated values reflected in the financial statements. SERS' private equity investments are categorized into the following strategies:

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- **Buyouts** is characterized chiefly by investments in established private or publicly listed firms that are undergoing a fundamental change in operations or strategy.
- **Venture Capital** is characterized chiefly by high-risk investments in new or young companies following a growth path (early, late, and balanced stage funds) in technology and other value-added sectors.
- **Special Situations** is characterized chiefly by investments in funds that acquire distressed companies or companies in need of restructuring, funds from the secondary market, and funds providing mezzanine financing.
- **Legacy Private Equity** is characterized chiefly by consolidating legacy assets from various Private Equity core sub asset-classes (Buyouts, Venture Capital, Special Situations) that are being managed by a third-party administrator which provides day-to-day oversight of operations.
- **Private Credit Funds** is characterized chiefly by closed-end (drawdown) limited partnership structures with liquidity events in five years or more, which may include investment strategies such as direct lending, specialty lending, mezzanine, and distressed investing.

Real estate limited partnerships are valued at the NAV of SERS' ownership percentage in partners' capital. The investment managers use third-party appraisals based on discounted cash flows, recent comparable sales, and current market conditions to arrive at NAV. For SERS' Value Add/Opportunistic Funds and Core/Core Plus, NAV is updated by independent appraisals typically at least every three years by appraisers who meet specific professional qualifications. The appraisal process involves significant judgment and estimating; thus, the value upon sale of an asset may differ from its appraised value.

Any assumptions and estimates used in developing the NAV have been reviewed and approved by valuation committees. Because the investments in such partnerships are generally illiquid with holding periods lasting seven to 10 years, the value realized by SERS upon disposition may differ materially from estimated values reflected in the financial statements. The following portions of SERS' real estate investments are valued at NAV:

- **Core/Core Plus** are a long-term investment in high-quality real estate that generates returns primarily from stable income producing properties. These are open-end funds.
- **Value Add/Opportunistic Funds** utilize greater leverage and development strategies relative to core strategies, thereby taking higher risks but demand higher returns. Returns are primarily generated from capital appreciation from opportunistic investments. Strategies for this category of investing can include niche opportunities that are typically not available in core-style investing. These are closed-end funds.
- **Natural Resources/Infrastructure** differ from real estate in that they focus on other real assets other than real estate but maintain the characteristics of collateralization by hard assets and income-producing potential.

Hedge funds are valued on a monthly basis by general partners based on information provided by underlying hedge fund investments (if a fund-of-hedge fund structure), third-party administrators, and brokers. Hedge fund investments in limited partnerships are valued using NAV of units held at the end of the period based on the fair value of underlying investments.

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Hedge fund investments are categorized into the following specific strategies:

- **Credit-Focused Strategies** are investments that include directional and relative value investments through various structures, excluding closed-end funds, that may include debt securities, credit derivatives and related instruments, and/or multi-sector fixed income funds.
- **Funds-of-Hedge Funds** were investments in funds with investment managers who invest in hedge funds. Funds-of-Hedge Funds provided an additional layer of fiduciary oversight (investment, legal, compliance, and monitoring) with similar all-in fees as direct investments in hedge funds. SERS was the only limited partner and was able to make larger allocations, which lowered fees and improved liquidity terms. The assets are to be sold in an orderly fashion as market conditions dictate.
- **Direct Investments** were investments where SERS and other institutional investors pool their funds with a manager tasked with incorporating hedge strategies. The assets are to be sold in an orderly fashion as market conditions dictate.
- **Absolute Return Strategies** were investments intended to produce uncorrelated diversified return streams in the portfolio to help preserve and enhance the real value of the pension fund over long periods of time. The assets are to be sold in an orderly fashion as market conditions dictate.

Commingled fixed income funds are pooled investments in multiple debt-type securities, which are valued at NAV. Target date funds invest over multiple asset types at varying allocation percentages based on planned maturity of the fund. The NAV for commingled fixed income funds and target date funds is calculated using the closing price of the underlying investments, with the total value of the fund being apportioned to SERS based on units of ownership.

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December 31, 2019 and 2018

At December 31, 2019 and 2018, the Defined Benefit Plan's investments measured at NAV are shown in the following tables:

Defined Benefit Plan Investments Measured at NAV (2019)

(\$ thousands)

	NAV	Unfunded Commitments	Redemption Frequency	Redemption Notice
Private equity				
Buyouts	\$1,981,336	\$1,612,770	NA	NA
Venture captial	745,248	291,499	NA	NA
Legacy Private Equity	745,134	144,465	NA	NA
Special situations	415,681	624,912	NA	NA
Private credit funds	305,651	1,197,282	NA	NA
Total private equity	4,193,050	3,870,928		
Real estate				
Core/core plus	741,293	366,868	Quarterly	60 - 90 days
Value add/opportunistic funds	447,771	565,896	NA	NA
Natural resources/infrastructure	5,743	—	Daily	None
Total real estate	1,194,807	932,764		
Hedge funds				
Credit-focused strategies	969,849	—	Quarterly	95 days
Absolute return strategies	2,460	—	See note ^{1/}	See note ^{1/}
Direct investments	2,425	—	See note ^{1/}	See note ^{1/}
Total hedge funds	974,734	—		
Commingled fixed income funds				
Commingled fixed income funds	559,587	—	Quarterly	30 days
Total	\$6,922,178	\$4,803,692		

^{1/}The assets are to be sold in an orderly fashion as market conditions dictate.

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December 31, 2019 and 2018

Defined Benefit Plan Investments Measured at NAV (2018)

(\$ thousands)

	NAV	Unfunded Commitments	Redemption Frequency	Redemption Notice
Private equity				
Buyouts	\$1,773,423	\$1,741,014	NA	NA
Legacy Private Equity	983,302	199,463	NA	NA
Special situations	543,658	268,566	NA	NA
Venture captial	506,141	235,797	NA	NA
Private credit funds	93,075	802,561	NA	NA
Total private equity	3,899,599	3,247,401		
Real estate				
Core/core plus	591,351	—	Quarterly	60 - 90 days
Value add/opportunistic SMA	402,795	382,861	NA	NA
Natural resources/infrastructure	5,557	—	Daily	None
Total real estate	999,703	382,861		
Hedge funds				
Credit-focused strategies	872,594	—	Quarterly	95 days
Funds-of-hedge funds	10,185	—	See note ^{1/}	See note ^{1/}
Direct investments	3,806	—	See note ^{1/}	See note ^{1/}
Absolute return strategies	3,768	—	See note ^{1/}	See note ^{1/}
Total hedge funds	890,353	—		
Commingled fixed income funds				
Commingled fixed income funds	521,474	—	Quarterly	30 days
Total	\$6,311,129	\$3,630,262		

^{1/}The assets are to be sold in an orderly fashion as market conditions dictate.

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At December 31, 2019, the Defined Contribution Plan's investments measured at NAV are shown in the following table:

Defined Contribution Plan Investments Measured at NAV (2019)

(\$ thousands)

	NAV	Unfunded Commitments	Redemption Frequency	Redemption Notice
Commingled fixed income funds				
Commingled fixed income funds	\$150	NA	Daily	1 - 14 days
Target date funds				
Target date funds	7,898	NA	Daily	1 - 14 days
Total	\$8,048	NA		

SERS also has investments that are not measured at fair value or NAV. SERS owns a portion of the commonwealth Treasury Department's short-term investment fund (STIF). SERS' portion of STIF is valued at cost plus accrued interest, which approximates fair value. Additionally, SERS also has investments that are carried at either cost or liquidation basis values.

At December 31, 2019 and 2018, the Defined Benefit and Defined Contribution Plans' investments not measured at fair value or NAV are shown in the following tables:

Investments Not Measured at Fair Value or NAV

(\$ thousands)

Defined Benefit Plan

	2019	2018
Short-term investments	\$1,661,979	\$1,145,805
Hedge funds	30,684	31,145
Fixed income	1,484	794
Equity	207	145
Other investment	2	2
Total	\$1,694,356	\$1,177,891

Defined Contribution Plan

	2019	2018
Short-term investments	\$4,434	\$4,460
Total	\$4,434	\$4,460

For the years ended December 31, 2019 and 2018, the money weighted rate of return for SERS' Defined Benefit Plan, net of manager fees, was 18.8% and -4.5% respectively. A money weighted rate of return expresses investment performance, net of manager fees, adjusted for the changing amounts actually invested.

SERS' investment office, in consultation with the board and its investment consultants, updates the SERS strategic investment plan every two years. In April 2018, the board approved the SERS *2018-2019 Investment Plan*. Assets were managed according to this plan with a long term objective of achieving and maintaining a fully funded status in the Defined Benefit Plan.

Under that plan, Fixed Income and Cash were structured to generate income to pay benefits; provide liquidity to minimize capital impairment risk; reduce volatility in the total fund; protect the fund against deflation (and inflation via inflation protection securities); and contribute to total fund return when market conditions permit. The target asset allocation was based on a 7.25% assumed investment rate of return.

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The following table shows the Defined Benefit Plan's long-term 10-year strategic target asset allocation in place during the 2018 and 2019 investment periods:

Target Asset Allocation

Asset Class	2018-2019
Private Equity	16%
Global Public Equity	48
Real Estate	12
Multi-Strategy	10
Fixed Income	11
Cash	3
Total	100%

In recognition of a changing market environment and a desire to provide an opportunity to reduce risk while maintaining the potential for achieving a reasonable long-term assumed investment rate of return, the SERS Board, in June 2019, moved to reduce the Defined Benefit Plan assumed rate of return from 7.25% to 7.125% effective with the December 31, 2019, actuarial valuation.

In December 2019, the SERS Board adopted a revised statement of investment policy and a 10-year asset allocation strategy designed to further mitigate risk, reduce external management fees, and increase fund liquidity while meeting the Defined Benefit Plan's long-term return assumption. The new asset allocation targets increased exposure to liquid, fixed income-oriented investments while simultaneously reducing exposure to less liquid non-traditional strategies.

SERS' investments are subject to various risks. Among these risks are concentration of credit risk, custodial credit risk, credit risk, interest rate risk, and foreign currency risk.

Concentration of credit risk is the risk of loss attributed to the magnitude of investment in a single issuer. As of December 31, 2019 and 2018, SERS had no single issuer that exceeded 5% of total investments. Investments issued or explicitly guaranteed by the U.S. government and investments in mutual funds, external investment pools, and other pooled investments were excluded.

Custodial credit risk for investments is the risk that, in the event of the failure of the counterparty to a transaction, SERS would be unable to recover the value of investment or collateral securities that are in the possession of an outside party. Pursuant to the retirement code (71 Pa. C.S. §5931(c)), the State Treasurer serves as custodian of the Defined Benefit Plan. In accordance with a contractual relationship between the commonwealth's Treasury Department and its custodial agent, substantially all investments, where securities are used as evidence of the investment, are held by the custodian in book-entry form in SERS' name. Those investments are defined as insured or registered investments for which the securities are held by SERS or its agent and, therefore, have a very minimal level of custodial credit risk losses. All remaining investments do not have securities that are used as evidence of the investments. These investments are primarily in commingled funds, hedge funds, and limited partnerships, which include real estate and private equity.

Credit risk is the risk that an issuer or other counterparty to an investment will not fulfill its obligations. The credit risk of a debt instrument is measured by nationally recognized statistical rating agencies such as Moody's Investors Services (Moody's), Standard and Poor's (S&P), and Fitch Ratings (Fitch).

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For Defined Benefit Plan fixed income and short term investment holdings exposed to credit risk, the following tables disclose aggregate fair value, by the least favorable credit rating issued using Moody's, S&P, and Fitch credit ratings at December 31, 2019 and 2018 by debt sector.

Debt Securities Exposed to Credit Risk (2019)

(\$ thousands)

	AAA	AA	A	BAA	BA and below	NA ^{1/}	Short-Term Investments ^{2/}	Total Exposed to Credit Risk ^{3/}
Short-term investments ^{2/}	\$—	\$—	\$—	\$—	\$—	\$—	\$1,661,824	\$1,661,824
Asset- and mortgage-backed securities	121,181	387,322	15,086	1,516	373,151	3,736	—	901,992
Corporates	16,395	36,839	228,939	396,741	141,846	6,298	—	827,058
Private placements ^{4/}	19,700	21,006	40,864	169,670	267,403	56,202	—	574,845
Sovereign debt	17,017	51,621	21,002	84,694	267,227	3,378	—	444,939
Government	173	12,816	2,292	7,888	170	—	—	23,339
Agencies	9,222	13,458	—	—	—	—	—	22,680
Total	\$183,688	\$523,062	\$308,183	\$660,509	\$1,049,797	\$69,614	\$1,661,824	\$4,456,677

Debt Securities Exposed to Credit Risk (2018)

(\$ thousands)

	AAA	AA	A	BAA	BA and below	NA ^{1/}	Short-Term Investments ^{2/}	Total Exposed to Credit Risk ^{3/}
Short-term investments ^{2/}	\$—	\$—	\$—	\$—	\$—	\$—	\$1,144,614	\$1,144,614
Asset- and mortgage-backed securities	248,800	315,671	16,979	457	358,533	2,094	—	942,534
Corporates	18,480	34,921	205,808	384,338	118,842	3,213	—	765,602
Private placements ^{4/}	4,501	24,165	24,712	152,805	212,365	35,013	—	453,561
Sovereign debt	15,500	53,058	27,850	62,595	260,633	3,810	—	423,446
Agencies	8,255	43,411	—	—	—	—	—	51,666
Government	164	13,783	5,666	3,851	313	—	—	23,777
Total	\$295,700	\$485,009	\$281,015	\$604,046	\$950,686	\$44,130	\$1,144,614	\$3,805,200

^{1/}Represents other securities that were either not rated or had a withdrawn rating.

^{2/}Represents short-term investments mostly in the commonwealth Treasury Department's STIF, which is not rated. This category comprises short-term, investment grade securities, which are mainly U.S. treasuries, agencies, or repurchase agreements.

^{3/}Debt securities exposed to credit risk and U.S. government guaranteed securities, as noted in the subsequent paragraph, comprised short-term investments, commingled fixed income funds, and fixed income from the Statements of Fiduciary Net Position.

^{4/}Private placements raise capital via offerings directly to qualified investors rather than through public offerings. Private placements do not have to register with the Securities and Exchange Commission if the securities are purchased for investment as opposed to resale. These private placements have exposure to various fixed income securities.

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U.S. government guaranteed securities with a fair value of \$2.1 billion and \$1.9 billion as of December 31, 2019 and 2018, respectively, are not included in the previous tables because they are not subject to credit risk.

The Defined Contribution Plan is exposed to credit risk through investment in the commonwealth Treasury Department's STIF, which is not rated. The plan had \$4.4 million and \$4.5 million in STIF as of December 31, 2019 and 2018, respectively. The plan also has indirect exposure to credit risk through the commingled fixed income funds, which had a cumulative balance of \$150,000 as of December 31, 2019. These funds hold investment grade securities.

Interest rate risk is the risk that interest rate changes will adversely affect the fair value of an investment.

As a means for limiting SERS' exposure to fair value losses arising from rising interest rates, SERS' long-term asset allocation policy diversifies its fixed income core segment between intermediate duration and longer duration strategies based on the Bloomberg Barclays U.S. Aggregate Bond Index. Duration is a measure of an investment's sensitivity to changes in interest rates. The higher the duration, the greater the changes in fair value when interest rates change. SERS measures interest rate risk using option adjusted duration, which considers the effect of a security's embedded options on cash flows.

At December 31, 2019 and 2018, SERS' Defined Benefit Plan had the following option-adjusted durations by debt sector:

Debt Option-Adjusted Durations

(\$ thousands)

	2019		2018	
	Fair Value	Option-Adjusted Duration	Fair Value	Option-Adjusted Duration
Sovereign debt	\$231,729	9.0	\$234,120	7.6
Government	2,104,363	7.4	1,835,363	6.5
Agencies	22,680	6.7	51,666	4.5
Corporates	827,058	6.4	765,602	5.7
Private placements ^{1/}	574,845	4.4	453,561	4.4
Commingled investment funds	559,587	3.5	521,474	3.5
Asset- and mortgage-backed securities	626,387	3.1	673,339	4.1
Short-term investments - (STIF)	1,623,574	0.1	995,057	0.1
Short-term investments	38,250	0.0	149,557	0.0
Total^{2/}	\$6,608,473		\$5,679,739	

^{1/}Private placements raise capital via offerings directly to qualified investors rather than through public offerings. Private placements do not have to register with the Securities and Exchange Commission if the securities are purchased for investment as opposed to resale. These private placements have exposure to various fixed income securities.

^{2/}Total fair values exposed to interest rate risk comprised short-term investments, commingled fixed income funds, and fixed income from the Statements of Fiduciary Net Position.

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The Defined Contribution Plan is exposed to interest rate risk through investment in the commonwealth Treasury Department's STIF, which had a duration of approximately one month at December 31, 2019 and 2018, respectively. The plan had \$4.4 million and \$4.5 million in STIF as of December 31, 2019 and 2018, respectively. The plan also has indirect exposure to interest rate risk through commingled fixed income funds, which have an average duration of approximately 5.6 years at December 31, 2019.

The cumulative balance of these funds was \$150,000 as of December 31, 2019.

Foreign currency risk is the risk that fluctuations in exchange rates will adversely affect the fair value of an investment. As part of SERS' program to manage risk and enhance returns, SERS invests in global markets. At December 31, 2019 and 2018, the SERS Defined Benefit Plan had the following currency exposures:

Foreign Currency Exposures (2019)

(\$ thousands)

Currency	Short-Term Investments ^{1/}	Fixed Income	Common and Preferred Stocks	Other Investments	Real Estate	Private Equity	Total
European Euro	\$9,780	\$27,673	\$260,145	(\$7,580)	\$196,417	\$197,863	\$684,298
British Pound Sterling	370	36,123	194,129	31,866	—	—	262,488
Swiss Franc	6,721	—	120,476	(5,084)	—	—	122,113
Japanese Yen	528	—	109,035	3,749	—	—	113,312
Australian Dollar	54	12,099	72,185	9,669	—	—	94,007
Swedish Krona	(3)	—	17,613	11,315	—	63,413	92,338
Hong Kong Dollar	53	—	64,651	—	—	—	64,704
South Korean Won	1,229	—	44,417	11,976	—	—	57,622
Canadian Dollar	177	4,692	52,481	(1,858)	—	—	55,492
Danish Krone	1,340	—	50,993	273	—	—	52,606
Mexican Peso	173	25,442	21,466	(1,967)	461	—	45,575
Norwegian Krone	89	—	18,504	10,393	—	—	28,986
Indonesian Rupiah	175	7,746	17,826	1,868	—	—	27,615
New Taiwan Dollar	17	—	23,916	—	—	—	23,933
Chilean Peso	—	—	—	13,662	—	—	13,662
New Zealand Dollar	80	—	4,118	8,518	—	—	12,716
Polish Zloty	220	8,783	814	1,756	—	—	11,573
Malaysian Ringgit	100	9,786	422	—	—	—	10,308
Brazilian Real	1,141	8,931	—	—	—	—	10,072
Colombian Peso	250	9,170	—	—	—	—	9,420
Thai Baht	7	—	5,355	(4)	—	—	5,358
Turkish Lira	—	—	4,918	—	—	—	4,918
Other currencies (8)	1,648	9,092	7,941	(2,135)	—	—	16,546
Total	\$24,149	\$159,537	\$1,091,405	\$86,417	\$196,878	\$261,276	\$1,819,662

^{1/}Includes receivables and payables as of December 31 for securities sold and purchased.

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Foreign Currency Exposures (2018)

(\$ thousands)

Currency	Short-Term Investments ^{1/}	Fixed Income	Common and Preferred Stocks	Other Investments	Real Estate	Private Equity	Total
European Euro	\$7,459	\$33,856	\$220,471	(\$14,237)	\$—	\$109,899	\$357,448
British Pound Sterling	1,678	42,314	146,841	6,332	—	—	197,165
Hong Kong Dollar	1	—	156,730	(1)	—	—	156,730
South Korean Won	2,037	—	133,635	—	—	—	135,672
Japanese Yen	369	—	100,767	24,634	—	—	125,770
Swiss Franc	8,546	—	93,544	(7,746)	—	—	94,344
Australian Dollar	150	11,093	43,920	4,961	—	—	60,124
New Taiwan Dollar	86	—	53,415	—	—	—	53,501
Swedish Krona	(3)	—	—	28,699	—	24,177	52,873
Mexican Peso	209	23,489	23,266	—	412	—	47,376
Canadian Dollar	233	2,023	29,251	9,742	—	—	41,249
Danish Krone	1,140	—	30,645	278	—	—	32,063
South African Rand	374	11,826	21,268	(1,812)	—	—	31,656
Indonesian Rupiah	198	8,230	22,771	—	—	—	31,199
Brazilian Real	468	8,558	21,652	—	—	—	30,678
Norwegian Krone	124	—	10,914	7,348	—	—	18,386
Malaysian Ringgit	127	12,417	3,981	—	—	—	16,525
New Zealand Dollar	50	—	11,891	416	—	—	12,357
Polish Zloty	91	12,214	1,042	(1,342)	—	—	12,005
Thai Baht	5	—	11,205	36	—	—	11,246
Hungarian Forint	—	—	10,059	—	—	—	10,059
Colombian Peso	200	4,733	—	3,491	—	—	8,424
Other currencies (9)	1,692	4,623	10,610	727	—	—	17,652
Total	\$25,234	\$175,376	\$1,157,878	\$61,526	\$412	\$134,076	\$1,554,502

^{1/}Includes receivables and payables as of December 31 for securities sold and purchased.

The Defined Contribution Plan has indirect foreign currency exposure through target date funds and the Global Non-U.S. Stock Index Fund, which is classified as a commingled public equity fund on the Statements of Fiduciary Net Position. Target date funds are diversified across global asset classes, with allocations changing over the funds' investment horizon. The funds include varying degrees of international equity and fixed income as part of their allocations. The Global Non-U.S. Stock Index Fund tracks the performance of the MSCI All Country World Index (ACWI) ex-U.S. index, which is made up of non-U.S. stocks from 23 developed markets and 26 emerging markets.

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(5) Securities Lending

In accordance with a contract between the commonwealth's treasurer and its custodian, the SERS Defined Benefit Plan participates in a securities lending program.

The custodian, acting as lending agent, lends the plan's equity, debt, and money market securities for cash, securities, or letter of credit collateral. Collateral is required at 102% of the fair value of the securities loaned except for the equity securities of non-U.S. corporations, for which collateral of 105% is required. Collateral is marked to market daily. If the collateral falls below guidelines for the fair value of the securities loaned, additional collateral is obtained. Cash collateral is invested by the lending agent in accordance with investment guidelines approved by the board. The lending agent cannot pledge or sell securities collateral unless the borrower defaults.

As of December 31, 2019 and 2018, the Defined Benefit Plan's credit exposure to individual borrowers was limited because the amounts owed to the borrowers exceeded the amounts the borrowers owed the plan. The treasurer's contract with the lending agent requires the agent to indemnify the plan if the borrowers fail to return the underlying securities and the collateral is inadequate to replace the loaned securities or if the borrowers fail to pay income distributions on the loaned securities.

All loaned securities at December 31, 2019 and 2018, could be terminated on demand by either the lending agent or the borrower. Cash collateral is invested in a short-term collective investment pool. The duration of the investments in the pool at December 31, 2019 and 2018 was two days and one day, respectively. Interest rate risk may be posed by mismatched maturities and could be affected by other program features, such as the lending agent's ability to reallocate loaned securities among all of its lending customers.

As of December 31, 2019 and 2018, for the Defined Benefit Plan, the fair value of loaned securities was

\$687 million and \$274 million, respectively; the fair value of the associated collateral was \$700 million and \$285 million, of which \$138 million and \$164 million was cash, respectively. As of December 31, 2019 and 2018, noncash collateral of \$562 million and \$121 million, respectively, was invested in U.S. government guaranteed securities, which are not subject to credit risk.

(6) Derivative and Structured Financial Instruments and Restricted Assets

Within narrowly prescribed guidelines, the SERS Defined Benefit Plan permits investment managers to directly enter into certain derivative and structured financial instruments primarily to hedge risk and reduce the volatility of its portfolio. Typically, investment managers enter into foreign exchange contracts to make payment for international investments and to hedge currency risk, futures contracts to manage interest rate risk, and swaps to more efficiently gain investment exposure in the equity and credit markets.

SERS also indirectly holds derivatives and financial instruments through commingled fund and hedge fund managers in the Defined Benefit Plan and Defined Contribution Plan. At a fund level, these managers hold foreign exchange contracts, futures contracts, and certain swap contracts. These funds invest in instruments directly and indirectly to gain foreign exchange exposure, to synthetically create equity-like returns, and to manage interest rate risk by altering the average life of the portfolio. Derivatives are viewed within the context of the fund's total portfolio and are consistent with the funds' overall strategy.

SERS is exposed to counterparty credit risk on all open derivative positions. Counterparty credit risk is the risk that a derivative counterparty may fail to meet its payment obligation under the derivative contract. As of December 31, 2019 and 2018, SERS direct counterparty credit risk was not significant. SERS mitigates its legal risk on investment holdings including derivatives by ensuring that all of our legal requirements (indemnification, sovereign immunity, jurisdiction, etc.) are acknowledged and agreed to in

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all of the derivatives agreements to which they are subject.

Foreign exchange contracts are agreements to exchange the currency of one country for the currency of another country at an agreed-upon price and settlement date. The investment manager uses these contracts primarily for its international investments to settle pending trades that occur more than two business days after trade date. The contracts are used by the investment manager for the purpose of eliminating foreign exchange risk. As a matter of policy, the investment managers enter into

these contracts at their full discretion to protect currency fluctuations. To reduce the risk of counterparty nonperformance, the investment managers generally enter into these contracts with institutions regarded as meeting high standards of creditworthiness. The unrealized gain/loss on contracts is included in the net position and represents the fair value of the contracts on December 31.

At December 31, 2019 and 2018, the Defined Benefit Plan directly owned contracts to purchase and sell by foreign currencies are shown in the following tables:

Foreign Exchange Contracts (2019)

(\$ thousands)

Currency	Purchases	Unrealized Gain/(Loss)	Sales	Unrealized Gain/(Loss)
British Pound Sterling	\$38,601	\$944	\$6,736	(\$160)
Chilean Peso	13,662	(116)	—	—
Norwegian Krone	13,105	440	2,711	51
European Euro	13,016	142	20,597	(225)
South Korean Won	11,976	296	—	—
Swedish Krona	11,315	256	—	—
Australian Dollar	10,750	229	1,081	(17)
New Zealand Dollar	8,518	420	—	—
Czech Koruna	3,913	142	—	—
Japanese Yen	3,844	21	95	—
Polish Zloty	3,142	55	1,386	(52)
Russian Ruble	2,646	80	—	—
Indonesian Rupiah	1,868	55	—	—
Mexican Peso	1,041	33	3,008	(92)
Canadian Dollar	597	13	2,455	(34)
Danish Krone	273	3	—	—
South African Rand	—	—	8,694	(567)
Swiss Franc	—	—	5,084	(78)
Thai Baht	—	—	4	—
Total	\$138,267	\$3,013	\$51,851	(\$1,174)

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Foreign Exchange Contracts (2018)

(\$ thousands)

Currency	Purchases	Unrealized Gain/(Loss)	Sales	Unrealized Gain/(Loss)
Swedish Krona	\$28,699	\$39	\$—	\$—
Japanese Yen	24,634	610	—	—
Norwegian Krone	10,422	(281)	3,074	144
Canadian Dollar	9,778	(492)	36	—
British Pound Sterling	8,197	34	1,864	(15)
European Euro	5,711	23	19,949	54
Australian Dollar	4,961	(126)	—	—
Colombian Peso	3,491	(95)	—	—
Argentina Peso	727	24	—	—
New Zealand Dollar	416	—	—	—
Danish Krone	278	—	—	—
Thai Baht	36	—	—	—
Swiss Franc	—	—	7,746	187
South African Rand	—	—	1,812	(6)
Polish Zloty	—	—	1,342	20
Hong Kong Dollar	—	—	1	—
Total	\$97,350	(\$264)	\$35,824	\$384

Swap agreements provide for periodic payments between parties based on the change in value of underlying assets, indexes, rates, and creditworthiness. SERS' managers use contracts with multiple counterparties as well as collateral posting requirements to manage its counterparty credit risk. Credit default swaps are agreements with counterparties to either purchase or sell credit protection. SERS' managers use credit default swaps to either increase or decrease credit exposure to certain credit markets. Interest rate swaps are over-the-counter contracts that allow counterparties to exchange a fixed rate liability for a floating rate liability or vice versa. SERS' managers use interest rate swaps as a cost-effective way of gaining exposure to certain sectors of the fixed income market. SERS' direct exposure to swap agreements was not significant at December 31, 2019 and 2018.

(7) Other Post-Employment Benefits (OPEB) for Employees of SERS

(a) Plan Description

SERS employees, working in both the Defined Benefit and Defined Contribution Plans, are eligible

to participate in the Retired Employees Health Program (REHP) if they meet certain criteria upon retirement. The REHP is a single employer defined benefit OPEB plan that includes commonwealth agencies and some component units. The REHP is established as a trust equivalent arrangement. The REHP is administered by the Pennsylvania Employees Benefit Trust Fund (PEBTF), which acts as a third-party administrator under an administrative agreement with the commonwealth. The REHP is provided as a part of collective bargaining agreements with most commonwealth labor unions. All policy decisions and types and levels of benefits for the REHP fall under the purview of the commonwealth's Executive Board, and the Secretary of Administration. The REHP does not have a governing board.

Detailed information about the REHP is reported in the commonwealth's Comprehensive Annual Financial Report (CAFR) as an other employee benefit trust fund. The REHP is reported using the economic resources measurement focus and the accrual basis of accounting. The commonwealth's

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CAFR is an audited financial statement and is available at www.budget.pa.gov.

(b) Benefits Provided

Eligible employees who retire from the state and meet one of the following eligibility criteria are eligible to receive REHP benefits:

- 25 or more years of service
- 20 or more years of service and superannuation age – Age 50 for Park Rangers, Capitol Police and certain enforcement officers or 60 for general employees (age 55 or 65 for employees subject to Act 2010-120)
- Disability retirement – requires five years of service (no service requirement for enforcement officers)

Spouses and dependents are eligible for subsidized postemployment medical coverage while the retiree is alive. The Patient Protection and Affordable Care Act (PPACA), signed into law on March 23, 2010, increased the dependent child age limit to age 26 and applied to the Commonwealth effective January 1, 2011.

(c) Contributions

Employer contributions for retiree healthcare benefits are charged as a component of payroll expenditures on a “pay as you go” basis. During 2019 and 2018, SERS funded REHP benefits by paying a set dollar amount per pay period for each active SERS employee.

Retiree contributions ranged from 0 – 3% of final average salary, which varies depending on retirement date. In addition to the retiree contributions for those hired on or after August 1, 2003, non-Medicare retirees who elect the Choice PPO plan are required to pay the incremental cost between the Choice PPO plan and the least expensive plan (LEP) in their county of residence through monthly pension deductions (PPO buy-up). Surviving spouses of deceased retirees may continue to participate in the plan if they pay the full cost of the coverage.

(d) Proportionate Share of OPEB Amounts

The REHP undergoes an actuarial valuation each year and uses a June 30 measurement date.

At December 31, 2019 and 2018, SERS reported a liability of \$23.6 million and \$31.2 million for its proportionate share of the net OPEB liability respectively. SERS’ proportion of the net OPEB liability was based on actual contributions made to the REHP. At June 30, 2019 and 2018, SERS proportion was 0.227% and 0.213% respectively.

For the years ended December 31, 2019 and 2018, SERS recognized OPEB expense of \$3.9 million and \$2.0 million respectively, which is included with administrative expenses.

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At December 31, 2019 and 2018, SERS reported deferred outflows of resources and deferred inflows of resources related to OPEB from the following sources:

Schedule of Deferred Outflows and Inflows

(\$ thousands)

	2019		2018	
	Deferred Outflows of Resources	Deferred Inflows of Resources	Deferred Outflows of Resources	Deferred Inflows of Resources
Changes in assumptions or other inputs as of measurement date	\$755	\$3,269	\$—	\$4,104
Change in proportionate share and differences between actual and proportionate share employer contributions	2,460	1,119	—	1,418
Contributions subsequent to measurement date	574	—	646	—
Differences between expected and actual experience in total OPEB liability	—	17,555	—	9,562
Net differences between projected and actual earnings on plan investments	—	42	—	48
Total	\$3,789	\$21,985	\$646	\$15,132

(e) Actuarial Assumptions

The total OPEB liability was determined by an actuarial valuation as of June 30, 2019 and 2018. The following actuarial assumptions were used:

- Investment rate of return: 5% in 2019 and 2018
- Inflation: 2.60% in 2019 and 2018
- Projected salary increases: average career salary growth of 2.65% and general salary schedule increases of 2.90%, in 2019 and 2018
- Healthcare cost trend rates: 6.0% for 2019 and 6.2% for 2018, both decreasing to an ultimate rate of 4.1%
- Mortality rate for healthy participants: projected RP-2000 Mortality Tables adjusted for an improvement in certain age ranges and future improvement in life expectancy
- Mortality rate for disabled participants: projected RP-2000 Mortality Tables adjusted for future improvement in life expectancy

Assumptions mentioned above are based on SERS’ experience study covering the periods 2011–2015, which was released in March 2016.

The assets of the REHP are managed by the commonwealth’s Treasury Department in an investment pool. The REHP investments are made based upon an interagency agreement, dated June 17, 2008, and the prudent investor standard set forth in the commonwealth’s fiscal code 72 P.S. §30.1, amendment to the fiscal code, the principles of Prudent Investor Standards.

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The long-term expected rate of return on REHP plan investments is determined using a risk premium review. This review compares the current relationship between fixed income and equity and their relationship over long periods of time to come up with an expected rate of return. Other variables considered in the expected rates of return are a reversion to the mean for each asset class. Best estimates of arithmetic real rates of return for each major asset class included in the target asset allocation are summarized in the following table:

Long-Term Expected Real Rate of Return

Asset Class	2019		2018	
	Target Allocation	Long-Term Expected Real Rate of Return	Target Allocation	Long-Term Expected Real Rate of Return
Domestic equity	47 %	5.6 %	47 %	6.6 %
Fixed income	25	1.7	25	3.0
International equity	20	5.8	20	8.6
Real estate	8	4.6	8	6.9
Cash and cash	0	0.9	0	1.0
Total	100 %		100 %	

Since REHP has insufficient assets to meet next year's projected benefit payments, the discount rate was based on the index rate for 20-year tax-exempt general obligation municipal bond index rate with an average rating of AA/Aa or higher as of the measurement date. The commonwealth elected to determine the rate using the Bond Buyer 20-Bond General Obligation Index. As of June 30, 2019 and 2018, the discount rate was 3.50% and 3.87%, respectively.

(f) Sensitivity Analysis

Sensitivity of SERS' proportionate share of the net OPEB liability to changes in the discount rate and healthcare cost trend rates of 1% lower or higher is not significant. More detail regarding this at the REHP plan level can be found in the commonwealth's CAFR, which is an audited financial statement and is available at www.budget.pa.gov.

(g) Required Supplementary Information (RSI) for OPEB

The schedules of SERS' proportionate share of the net OPEB liability and SERS' contributions are not significant so the related RSI is not included within these financial statements. More detail regarding this at the REHP plan level can be found in the

commonwealth's CAFR, which is an audited financial statement and is available at www.budget.pa.gov.

(8) Litigation and Contingencies

SERS is involved in various individual lawsuits, generally related to benefit payments, which, in the event of an adverse result, could increase estimated actuarial liabilities by approximately \$1 billion. Some of the cases involve legal issues that, if extended to the entire membership, may result in significant costs to SERS. If such an event were to occur, the additional costs would be recovered by SERS through adjustments to the employer contribution rate. SERS makes every effort to defend its position in these proceedings.

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(9) Net Pension Liability

The components of the net pension liability of participating employers at December 31, 2019 and 2018, were as follows:

Net Pension Liability
(\$ thousands)

	2019	2018
Total pension liability	\$49,274,314	\$47,768,011
Plan fiduciary net position	31,096,319	26,936,990
Net pension liability	\$18,177,995	\$20,831,021
Plan fiduciary net position as a percentage of the total pension liability	63.1%	56.4%

The total pension liability was determined by an actuarial valuation for financial reporting purposes as of December 31, 2019 and 2018, using some of the following actuarial methods and assumptions:

- Actuarial cost method: entry age
- Investment rate of return: 7.125% net of manager fees including inflation for 2019 and 7.25% net of manager fees including inflation for 2018
- Projected salary increases: average of 5.60% with range of 3.70%–8.90% including inflation
- Asset valuation method: fair (market) value
- Inflation: 2.60%
- Mortality rate: projected RP-2000 Mortality Tables adjusted for actual plan experience and future improvement

The assumptions, unless otherwise approved by the board, mentioned above are based on the *18th Investigation of Actuarial Experience* study covering the periods 2011–2015, which was released in March 2016. SERS Board has elected to lower the investment rate of return twice over the past few years. The board lowered the investment rate of

return to 7.25% in 2017 and lowered it in 2019 to 7.125%.

The long-term expected real rate of return on pension plan investments is determined using a building-block method in which best-estimate ranges of expected future real rates of return (expected returns, net of manager fees and inflation) are developed for each major asset class. These ranges are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and by adding expected inflation. Best estimates of arithmetic real rates of return for each major asset class included in the pension plan’s target asset allocation in note 4 as of December 31, 2019 and 2018 (see the discussion of the pension plan’s investment policy) are summarized in the following tables:

**Long-Term Expected Real Rate of Return
(2018 and 2019)**

Asset Class	Long-Term Expected Real Rate of Return
Private Equity	7.25%
Global Public Equity	5.15
Real Estate	5.26
Multi-Strategy	4.44
Fixed Income	1.26
Cash	0.00

The discount rate used to measure the total pension liability was reduced to 7.125% in 2019 from 7.25% in 2018. The projection of cash flows used to determine the discount rate assumed that contributions from plan members will be made at the current contribution rates and that contributions from participating employers will be made at actuarially determined rates as set by statute. Based on those assumptions, the pension plan’s fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability.

FINANCIAL SECTION

Notes to Financial Statements

December 31, 2019 and 2018

The following presents the net pension liability calculated using the discount rate of 7.125% for 2019 and 7.25% for 2018, as well as what the net pension liability would be if it were calculated using a discount rate that is one percentage point lower or one percentage point higher than the current rate:

Sensitivity of the Net Pension Liability to Change in the Discount Rate (2019)

(\$ thousands)

	1% Decrease to 6.125%	Current Discount Rate of 7.125%	1% Increase to 8.125%
Net pension liability	\$23,098,119	\$18,177,995	\$13,965,787

Sensitivity of the Net Pension Liability to Change in the Discount Rate (2018)

(\$ thousands)

	1% Decrease to 6.25%	Current Discount Rate of 7.25%	1% Increase to 8.25%
Net pension liability	\$25,578,794	\$20,831,021	\$16,762,440

(10) Subsequent Events

Change in Fair Value of Investment Portfolio Due to COVID-19

In March 2020, the World Health Organization declared COVID-19 a global pandemic as a result of the virus' widespread impact on multiple regions of the world. The full extent and duration of the impact of COVID-19 on SERS' operations and financial performance is currently unknown, and depends on future developments that are uncertain and unpredictable, including the duration and spread of the pandemic, its impact on capital and financial markets on a macro-scale, and any new information that may emerge concerning the severity of the virus, its spread to other regions, and the actions to contain the virus or treat its impact, among others.

Required Supplementary Information

December 31, 2019 (unaudited)

Schedule 1

Schedule of Changes in Net Pension Liability and Related Ratios

(\$ millions)

	2019	2018	2017	2016	2015	2014	2013
Total pension liability							
Service cost	\$982	\$965	\$961	\$953	\$955	\$944	\$943
Interest	3,409	3,334	3,262	3,271	3,123	3,042	2,975
Changes of benefit terms	—	—	—	—	—	—	—
Differences between expected and actual experience	66	167	130	(534)	378	98	(143)
Changes of assumptions	562	—	—	947	669	—	—
Benefit payments, including refunds of member contributions	(3,513)	(3,395)	(3,304)	(3,228)	(3,081)	(2,946)	(2,844)
Net change in total pension liability	1,506	1,071	1,049	1,409	2,044	1,138	931
Total pension liability - beginning	47,768	46,697	45,648	44,239	42,195	41,057	40,126
Total pension liability - ending (a)	\$49,274	\$47,768	\$46,697	\$45,648	\$44,239	\$42,195	\$41,057
Plan fiduciary net position							
Contributions - employer	\$2,115	\$2,049	\$1,898	\$1,622	\$1,360	\$1,084	\$795
Contributions - member	405	394	383	375	372	366	352
Net investment income/(loss)	5,175	(1,442)	4,066	1,587	88	1,462	3,724
Benefit payments, including refunds of member contributions	(3,513)	(3,395)	(3,304)	(3,228)	(3,081)	(2,946)	(2,844)
Administrative expense	(23)	(26)	(26)	(23)	(22)	(22)	(22)
Net change in plan fiduciary net position	4,159	(2,420)	3,017	333	(1,283)	(56)	2,005
Plan fiduciary net position - beginning	26,937	29,405	26,388	26,055	27,338	27,394	25,389
Cumulative effect of change in accounting	NA	(48)	NA	NA	NA	NA	NA
Beginning balance restated	NA	29,357	NA	NA	NA	NA	NA
Plan fiduciary net position - ending (b)	31,096	26,937	29,405	26,388	26,055	27,338	27,394
Net pension liability - ending (a) - (b)	\$18,178	\$20,831	\$17,292	\$19,260	\$18,184	\$14,857	\$13,663
Plan fiduciary net position as a percentage of the total pension liability	63.1%	56.4%	63.0%	57.8%	58.9%	64.8%	66.7%
Covered payroll	\$6,329	\$6,179	\$5,984	\$5,912	\$5,972	\$5,720	\$5,598
Net pension liability as percentage of covered payroll	287.2%	337.1%	288.9%	325.8%	304.5%	259.7%	244.1%

Schedule 1 is intended to show information for 10 years. Additional years will be displayed as they become available.

See accompanying independent auditors' report.

FINANCIAL SECTION

Required Supplementary Information

December 31, 2019 (unaudited)

Schedule 2 Schedule of Employer Contributions (\$ millions)

Year ^{1/}	Actuarially Determined Contribution (ADC)	Contributions in Relation to the ADC	Contribution Deficiency (Excess)	Covered Payroll	Contributions as a Percentage of Covered Payroll
2019 ^{2/}	\$2,106	\$2,106	\$—	\$6,329	33.28%
2018 ^{2/}	2,040	2,040	—	6,179	33.02
2017 ^{2,3/}	1,884	1,884	—	5,984	31.47
2016 ^{2,3/}	1,614	1,614	—	5,912	27.30
2015 ^{3/}	1,360	1,360	—	5,972	22.78
2014 ^{3/}	1,084	1,084	—	5,720	18.95
2013 ^{3/}	795	795	—	5,598	14.20
2012 ^{3/}	566	566	—	5,539	10.22
2011 ^{3/}	392	392	—	5,582	7.02
2010 ^{3/}	273	273	—	5,597	4.88

^{1/}The rates used in developing the ADC in the above schedule of contributions are calculated as of December 31, two years prior to the first half, January 1 – June 30, of the year in which contributions are reported and one year prior to the second half, July 1 – December 31, of the year in which contributions are reported. The following funding valuation actuarial methods and assumptions were used to determine contribution rates reported in this schedule as of the December 31 annual funding valuations:

- Actuarial cost method: variation of entry-age cost method (all years)
- Asset valuation method: five-year smoothing (all years)
- Inflation: 2.75% from valuation years 2010 - 2015, and 2.6% from valuation years 2016 - 2019
- Projected average salary increases: 6.2% from valuation years 2010 - 2012, 6.1% from valuation years 2013 - 2014, 5.7% for valuation year 2015, and 5.6% from valuation years 2016 - 2019
- Assumed investment rate of return (net of manager fees including inflation): 8.0% for valuation year 2010, 7.50% from valuation years 2011 - 2015, 7.25% from valuation years 2016 – 2018, and 7.125% for valuation year 2019

^{2/}ADC excludes multiple service transfers made to SERS. These transfers are included as contributions on the Statements of Changes in Fiduciary Net Position.

^{3/}The ADC disclosed above is based on minimum floor rates or suppressed rates resulting from collars that were required based on statutory law. These rates were determined by SERS actuary during the annual funding valuation and include an adjustment to the “preliminary employer contribution rate” calculated before the minimum floor or collars were applied. These “final employer contribution rates” fell within the realm of an appropriate ADC calculation under actuarial standards of practice and temporarily deferred a portion of the payments that work towards fully funding the plan.

Schedule 3 Schedule of Investment Returns

	2019	2018	2017	2016	2015	2014	2013
Annual money-weighted rate of return, net of investment expense	18.8%	-4.5%	15.1%	6.4%	0.4%	6.4%	13.6%

Schedule 3 is intended to show information for 10 years. Additional years will be displayed as they become available.

See accompanying independent auditors' report.

Schedule 4
Schedule of Administrative Expenses
(\$ thousands)

	Defined Benefit Plan	Defined Contribution Plan	Total
Personnel services			
Salaries	\$8,323	\$1,211	\$9,534
Benefits	7,213	340	7,553
Temporary personnel wages, overtime, and out-service training	62	89	151
Total personnel services	15,598	1,640	17,238
Professional services			
Information technology services	3,538	2,712	6,250
Other commonwealth services	1,053	32	1,085
Consultant fees	844	107	951
Treasury department services	865	—	865
Third-party administrator expenses	—	218	218
Legal fees	56	15	71
Total professional services	6,356	3,084	9,440
Rentals			
Real estate rent	2,117	3	2,120
Other equipment rental	141	2	143
Total rentals	2,258	5	2,263
Communication			
Postage	322	275	597
Telephone	369	—	369
Printing and advertising	(34)	121	87
Total communication	657	396	1,053
Other expenses			
Maintenance	1,256	—	1,256
Office equipment	520	—	520
Supplies	458	8	466
Subscriptions and memberships	81	—	81
Travel and conferences	38	12	50
Total other expenses	2,353	20	2,373
Total administrative expenses before OPEB expense	27,222	5,145	32,367
OPEB expense	(3,947)	40	(3,907)
Total administrative expenses	\$23,275	\$5,185	\$28,460

See accompanying independent auditors' report.

FINANCIAL SECTION

Supplementary Information

December 31, 2019

Schedule 5 Summary of Investment and Consultant Expenses

(\$ thousands)

Investment Expenses

Expense Category	Expenses
Defined Benefit Plan manager investment expenses	
Private Equity	\$71,280
Real Estate	44,063
Global Public Equity	23,613
Multi-Strategy	23,295
Fixed Income	7,630
Legacy Hedge Funds	89
Total Defined Benefit Plan manager investment expenses	169,970
Investment consultants	3,816
Investment professional personnel	3,525
Custodian	1,503
Subscriptions and memberships	267
Operational	197
Legal	66
Total Defined Benefit Plan investment expenses	179,344
Defined Contribution Plan investment expenses	2
Total investment expenses	\$179,346

Consultant Expenses

Firm	Service Type	Expenses
Defined Benefit Plan investment consultant expenses		
StepStone Group	Private equity investments	\$1,999
NEPC	Real estate investments	515
Fairview Capital Partners	Investment portfolio management	485
Callan	General investments	331
McKinsey and Company	Special Services	224
RVK	General investments	168
Other	Other	94
Total Defined Benefit Plan investment consultant expenses		3,816
Defined Benefit Plan administrative consultant expenses		
Korn Ferry Hay Group	Actuary	797
Other	Multiple	47
Total Defined Benefit Plan administrative consultant expenses		844
Defined Contribution Plan consultant expenses	Multiple	107
Total consultant expenses		\$4,767

See accompanying independent auditors' report.

2019

Investment Section

May 28, 2020

State Employees' Retirement Board and Executive Director
State Employees' Retirement System
30 North Third Street, Suite 150
Harrisburg, Pennsylvania 17101

On behalf of SERS' investment office, I am pleased to present the investment section of the Pennsylvania State Employees' Retirement System (SERS) Comprehensive Annual Financial Report for calendar year 2019. The SERS Board administers a Defined Benefit Plan with approximately \$31.1 billion in assets, a Defined Contribution Plan with approximately \$12.4 million in assets, and a voluntary Deferred Compensation Plan offered to members with approximately \$3.9 billion in assets.

SERS' Defined Benefit Plan investment performance for the calendar year ended December 31, 2019, was 18.8%, net of investment management fees. This compares to a 2018 calendar year return of -4.6% net of investment management fees. While year-to-year returns are important, as long-term investors a longer time horizon is a more appropriate view of SERS' returns. The end of 2019 marks 10-, 15-, 20-, and 25-year periods of returns of 8.1%, 6.7%, 6.0%, and 8.4% (net of fees), respectively.

SERS' funded status as a percentage of total pension liability was approximately 56.5% (actuarial value), as of December 31, 2019. SERS' Board considers its funded status in selecting its risk tolerance, and as such SERS prioritizes an asset allocation to meet the long-term actuarial assumed rate of return, while maintaining an allocation to address the shorter-term liquidity needs of its members.

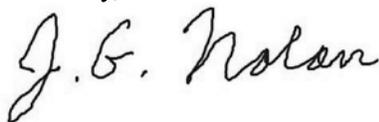
A number of key accomplishments were achieved in 2019, several of which are documented below. The investment section of this report provides further information regarding the investment program.

- Maintained low annual Defined Benefit Plan investment manager expenses paid to external firms of 58.3 basis points.
- In December 2019, adopted a new Target Asset Allocation Policy, which was designed to achieve SERS' investment return assumption of 7.125%, reduce annual investment manager fees, increase the allocation to liquid assets with low correlation to the public equity markets, and reduce the allocation to less liquid assets.
- Consolidated and streamlined five documents into the new *SERS' Defined Benefit Plan Investment Policy Statement*.
- Worked with SERS' General Consultant to present an Asset/Liability Study that fully links all three aspects of a plan's key financial drivers –Investment Policy, Contribution Policy, and Benefit Policy.
- Enhanced transparency by requiring general partners of new investment opportunities in private markets to provide SERS with the information found within the Institutional Limited Partners Association (ILPA) Reporting Template and requested general partners of existing investments in private markets to provide SERS with the information found within the ILPA Reporting Template.

- Enhanced quarterly performance reports by reporting both net-of-fee and gross-of-fee returns on a prospective basis, effective with the 1st Quarter 2020 performance report. Also, will report total fund performance against a commonly understood reference portfolio benchmark (e.g., global 60/40 index), and include graphically rolling returns over the last five years.
- Developed a semi-annual performance report in consultation with SERS' private market specialty consultants for public dissemination beginning with the semi-annual reporting period ending June 30, 2019. Assisted the SERS Board Chair and Executive Director by developing a process to request data from several hundred SERS' private market general partners to obtain permission to disclose additional details, with a great deal of success.
- Implemented a newly established Defined Contribution Plan.
- Optimized the investment lineup in the Deferred Compensation Plan, effective January 2020, by replacing the risk-profile funds with target date funds and added a more diverse international equity option, which aligns more closely to the Defined Contribution Plan investment lineup to reduce participant confusion.
- Committed \$2.1 billion to best-in-class private market funds.
- Expanded private equity co-investment program that will build upon SERS' investment capabilities and seek to improve efficiency of expected private equity returns relative to risk in a lower-cost manner.
- Recruited to fill three vacancies including a Managing Director, Portfolio Manager, and Analyst.

The SERS Investment Office continues to operate efficiently and effectively during the current challenging and changing global economic conditions. I remain confident that with a focus on the SERS mission, thoughtful leadership from the board, and a disciplined investment process aligned with the investment objectives, SERS and its members will continue on the path of financial security.

Sincerely,



James G. Nolan
Acting Chief Investment Officer

Investment Policy and Objectives

December 31, 2019 (unaudited)

Investment Policy

The SERS Board originally adopted a formal *Statement of Investment Policy* (policy) in 1979. It has been revised periodically to reflect and incorporate legislative changes governing investments and amendments to policies and procedures guiding the investment of the defined benefit portfolio. The information presented in the Investment Section of the 2019 CAFR references the *Commonwealth of Pennsylvania State Employees' Retirement Board Statement of Investment Policy Adopted April 21, 2004 and Amended March 8, 2017*, as this was the governing policy in place during the 2019 reporting period.

The purpose of the policy is to formalize the board's investment objectives and policies, and to define the duties and responsibilities of the various individuals and entities involved in the investment process.

The major elements of the policy are:

- The assets of the SERS Fund will be managed with the primary objectives of the payment of benefit obligations to participants in the plans as well as to maximize return with acceptable risk considerations and sufficient liquidity so that employer contributions can be minimized.
- The SERS Fund's overall investment objective is to provide a total rate of return, over full economic cycles, which achieves SERS' long-term actuarially assumed rate of return consistent with the board's tolerance for risk.
- The board's investment authority is governed by the prudent investor standard as set forth in Title 71, Pennsylvania Consolidated Statutes, Section 5931(a).
- The members of the board, employees of the board, and agents thereof shall stand in a fiduciary relationship to the members of the system regarding the investments and disbursements of any of the moneys of the fund and shall not profit either directly or indirectly with respect thereto.
- The board employs an investment staff which is responsible to the board to review and analyze the current investment climate, and to recommend adjustments with respect to the policy that are appropriate to take optimum advantage of new conditions and strategies as they arise in the market place. The staff also reviews and analyzes the philosophies, policies, and strategies employed by the investment managers, evaluating the appropriateness of their decision-making processes and their investment styles in relation to present and projected investment horizons.
- The board continually seeks to employ investment managers that possess superior capabilities in the management of assets of public retirement systems. Each manager has full discretion to carry out its investment mandate subject to the investment strategy statement contained in the investment management agreement and will be expected to conduct business on behalf of SERS in accordance with the mandate for which they were retained.
- SERS will employ investment consultants, who act as fiduciaries to the fund, and who will provide investment consulting services in their respective areas of expertise.

INVESTMENT SECTION

Investment Policy and Objectives

December 31, 2019 (unaudited)

- Where investment characteristics are equivalent, the policy will favor investments that will have a positive impact on the economy of the Commonwealth of Pennsylvania.
 - SERS instituted an Emerging Investment Manager Program designed to identify and gain early access to talented investment managers in their early stages to generate above benchmark returns (net of fees).
 - Achieve a net, total long-term return that meets or exceeds an appropriate, composite plan benchmark index on a five- to 10-year rolling time horizon. The composite benchmark index will be based on the asset allocation set forth in the investment plan approved by the board.
- preferably, in excess of this rate in order to improve the funded ratio of the SERS Fund through investment earnings and favorably impact future employer and employee contribution rates.

Investment Objectives

As indicated in the *Commonwealth of Pennsylvania State Employees' Retirement Board Statement of Investment Policy Adopted April 21, 2004 and Amended March 8, 2017*, the objectives of the SERS Fund are to provide benefit payments to participants and beneficiaries at the lowest cost to the commonwealth and to fund the program through a carefully planned and executed investment program.

Consistent with achieving these objectives, the board has established the following goals relative to investment performance:

- Achieve a net total return equivalent to the actuarial assumed rate of return, or

In December 2019, the SERS Board adopted a revised statement of investment policy, *SERS' Defined Benefit Plan and Investment Policy Statement*, which included a new 10-year asset allocation strategy designed to further mitigate risk, reduce external management fees, and increase fund liquidity while meeting its long-term return assumption. The new asset allocation targets increased exposure to liquid, fixed income-oriented investments while simultaneously reducing exposure to less liquid non-traditional strategies.

Investment Returns

December 31, 2019 (unaudited)

Calendar Year, Net-of-Fees Returns^{1/}

For the period ending December 31, 2019

Asset Class	1-Year Total Return	3-Year Total Return	5-Year Total Return	10-Year Total Return
Private Equity ^{2/5/}	9.6%	11.4%	9.5%	11.4%
<i>Burgiss All Private Equity Custom Index^{3/5/}</i>	7.2	13.1	11.3	13.0
<i>Russell 3000 Index+3%^{4/5/}</i>	6.7	16.2	13.7	16.4
Global Public Equity	27.0	12.2	8.5	9.5
<i>MSCI ACWIM Index (Net)</i>	26.4	12.1	8.3	8.9
Real Estate ^{5/}	11.0	3.4	4.6	7.0
<i>Real Estate Custom Benchmark^{5/6/}</i>	6.5	6.4	8.4	9.9
<i>Consumer Price Index +3%^{5/}</i>	4.7	5.1	4.5	4.8
Multi-Strategy ^{7/}	14.7	NA	NA	NA
<i>S&P/LSTA Leveraged Loan Index</i>	8.6	4.4	4.5	5.0
<i>Russell 3000 Index</i>	31.0	14.6	11.2	13.4
Fixed Income	9.5	4.3	3.1	4.8
<i>Bloomberg Barclays U.S. Aggregate Bond Index</i>	8.7	4.0	3.1	3.8
Cash	2.3	2.0	1.5	0.9
<i>BofA ML 3 Month U.S. T-Bill Index</i>	2.3	1.7	1.1	0.6
Total Fund^{8/}	18.8%	9.3%	6.9%	8.1%
<i>Total Fund Custom Benchmark</i>	<i>16.7%</i>	<i>9.3%</i>	<i>7.3%</i>	<i>8.2%</i>
<i>Total Fund Custom Public Market Equivalent Benchmark</i>	<i>16.3%</i>	<i>10.1%</i>	<i>7.8%</i>	<i>8.9%</i>
<i>Total Fund 60/40 Index</i>	<i>19.3%</i>	<i>9.0%</i>	<i>6.4%</i>	<i>7.1%</i>

^{1/}Returns for periods greater than one year are annualized. Performance was calculated using the Modified Dietz day-weighted return methodology.

^{2/}Historical Private Equity performance includes Buyouts, Special Situations, and Venture Capital.

^{3/}Intended to compare the program's performance to its peers.

^{4/}Long-term benchmark by which SERS measures its private market performance. Shorter term variances (1-year and 3-year) can be pronounced due to the nature of private assets and are not as relevant for benchmark purposes.

^{5/}Private Equity, Real Estate, and the corresponding Real Estate Custom Benchmark are reported on a quarter lagged basis.

^{6/}Calculated monthly using beginning of the month asset class weights applied to each corresponding primary benchmark return. The custom benchmark consists of the NCREIF ODCE Index (AWA) (Net) (quarter lag), the FTSE NAREIT U.S. Real Estate Index (quarter lag), and the Consumer Price Index +3% (Quarter lag).

^{7/}The Multi-Strategy asset class has an inception date of October 1, 2017. Performance returns greater than one year are unavailable as of December 31, 2019.

^{8/}Please note, because Legacy Hedge Funds are in liquidation, values and performance are no longer reported. However, all performance activity continues to be reflected in SERS' Total Fund return.

INVESTMENT SECTION

Investment Returns

December 31, 2019 (unaudited)

Fiscal Year, Net-of-Fees Returns^{1/}

For the period ending June 30, 2019

Asset Class	1-Year Total Return	3-Year Total Return	5-Year Total Return	10-Year Total Return
Private Equity ^{2/5/}	12.8%	12.3%	9.5%	12.4%
<i>Burgiss All Private Equity Custom Index^{3/5/}</i>	10.7	13.8	11.5	14.0
<i>Russell 3000 Index+3%^{4/5/}</i>	12.4	16.8	13.6	19.3
Global Public Equity	4.3	11.8	6.3	10.9
<i>MSCI ACWIM Index (Net)</i>	4.6	11.4	6.0	10.3
Real Estate ^{5/}	0.1	2.1	4.9	5.4
<i>Real Estate Custom Benchmark^{5/6/}</i>	8.0	6.8	8.9	8.8
<i>Consumer Price Index +3%^{5/}</i>	4.9	5.2	4.5	4.8
Multi-Strategy ^{7/}	6.7	NA	NA	NA
<i>S&P/LSTA Leveraged Loan Index</i>	4.0	5.2	3.7	6.2
<i>Russell 3000 Index</i>	9.0	14.0	10.2	14.7
Fixed Income	7.6	3.4	2.7	6.1
<i>Bloomberg Barclays U.S. Aggregate Bond Index</i>	7.9	2.3	3.0	3.9
Cash	2.4	1.7	1.3	0.8
<i>BofA ML 3 Month U.S. T-Bill Index</i>	2.3	1.4	0.9	0.5
Total Fund^{8/}	5.7%	8.7%	5.7%	8.6%
<i>Total Fund Custom Benchmark</i>	<i>6.9%</i>	<i>9.0%</i>	<i>6.1%</i>	<i>9.1%</i>
<i>Total Fund Custom Public Market Equivalent Benchmark</i>	<i>6.7%</i>	<i>9.6%</i>	<i>6.7%</i>	<i>9.8%</i>
<i>Total Fund 60/40 Index</i>	<i>6.6%</i>	<i>7.0%</i>	<i>4.7%</i>	<i>7.3%</i>

^{1/}Returns for periods greater than one year are annualized. Performance was calculated using the Modified Dietz day-weighted return methodology.

^{2/}Historical Private Equity performance includes Buyouts, Special Situations, and Venture Capital.

^{3/}Intended to compare the program's performance to its peers.

^{4/}Long-term benchmark by which SERS measures its private market performance. Shorter term variances (1-year and 3-year) can be pronounced due to the nature of private assets and are not as relevant for benchmark purposes.

^{5/}Private Equity, Real Estate, and the corresponding Real Estate Custom Benchmark are reported on a quarter-lagged basis.

^{6/}Calculated monthly using beginning of the month asset class weights applied to each corresponding primary benchmark return. The custom benchmark consists of the NCREIF - ODCE Index (AWA) (Net) (quarter lag), the FTSE NAREIT U.S. Real Estate Index (quarter lag), and the Consumer Price Index +3% (quarter lag).

^{7/}The Multi-Strategy asset class has an inception date of October 1, 2017. Performance returns greater than one year are unavailable as of June 30, 2019.

^{8/}Please note, because Legacy Hedge Funds are in liquidation, values and performance are no longer reported. However, all performance activity continues to be reflected in SERS' Total Fund return.

Defined Benefit Plan Values and Annual Return

December 31, 2019 (unaudited)

Defined Benefit Plan Values and Annual Return

(\$ millions)

Year Ended	Defined Benefit Plan Fair Value	Annual Total Defined Benefit Plan Rate of Return ^{1/}
1990	\$9,886	1.0%
1991	11,940	22.6
1992	12,453	7.4
1993	13,701	13.2
1994	13,330	-1.1
1995	16,343	25.2
1996	18,492	15.4
1997	21,312	18.5
1998	24,123	16.3
1999	28,093	19.9
2000	27,880	2.2
2001	24,706	-7.9
2002	20,880	-10.9
2003	24,536	24.3
2004	26,641	15.1
2005	28,752	14.5
2006	32,053	16.4
2007	35,516	17.2
2008	22,796	-28.7
2009	24,662	9.1
2010	25,886	11.9
2011	24,377	2.7
2012	25,389	12.0
2013	27,394	13.6
2014	27,338	6.4
2015	26,055	0.4
2016	26,388	6.5
2017	29,405	15.1
2018	26,937	-4.6
2019	31,096	18.8

^{1/}Returns were calculated using the Modified Dietz day-weighted return methodology.

INVESTMENT SECTION

Largest Assets Held

December 31, 2019 (unaudited)

U.S. Equity

Holding	Fair Value
Microsoft Corp	\$288,218,828
Apple Inc	277,114,862
Amazon.com Inc	162,236,656
Facebook Inc	119,725,609
Brookfield Asset Management Inc	111,871,727
Alphabet Inc Class C	106,817,202
Johnson and Johnson	101,002,722
Berkshire Hathaway Inc	94,055,258
JPMorgan Chase and Co	92,282,382
Mastercard Inc	90,533,682

Non-U.S. Equity

Holding	Fair Value
Linde PLC	\$48,420,912
LVMH Moet Hennessy Louis Vuitton	35,009,944
Taiwan Semiconductor Manufacturing Corp	33,942,020
Medtronic PLC	32,319,069
Keyence Corp	30,586,577
AIA Group Ltd	30,537,211
Accenture Plc	28,357,251
CSL Ltd	26,789,447
Duerr Ag	25,149,893
Konecranes Oyj	24,345,769

Non-U.S. Fixed Income

Holding	Fair Value
United Mexican States, 7.750% November 13, 2042	\$7,513,957
United Mexican States, 8.500% November 18, 2038	6,436,587
Petroleos Mexicanos, 7.690% January 23, 2050	6,230,460
United Mexican States, 8.500% May 31, 2029	5,929,401
Colombian Tes, 6.000% April 28, 2028	5,804,305
Mexico Government International, 4.500% April 22, 2029	5,581,185
Republic of South Africa Government, 8.750% February 28, 2048	4,734,241
United Kingdom Gilt, 0.375% March 22, 2062	4,533,578
United Kingdom Gilt, 0.625% March 22, 2040	4,412,436
Petroleos Mexicanos, 6.750% September 21, 2047	4,402,261

Note: A detailed list of SERS investment holdings as of December 31, 2019, may be viewed at www.sers.pa.gov.

Largest Assets Held December 31, 2019 (unaudited)

U.S. Government and Government Related Fixed Income

Holding	Fair Value
U.S. Treasury Note, 3.125% November 15, 2028	\$202,867,783
U.S. Treasury Note, 2.250% November 15, 2027	143,513,660
U.S. Treasury Note, 1.750% November 15, 2029	113,848,350
U.S. Treasury Inflation Index Note, 0.625% January 15, 2026	55,935,968
U.S. Treasury Bond, 5.250% November 15, 2028	53,251,110
U.S. Treasury Inflation Index Note, 0.125% July 15, 2022	50,059,382
U.S. Treasury Inflation Index Note, 2.375% January 15, 2025	44,715,299
U.S. Treasury Inflation Index Note, 0.250% July 15, 2029	42,737,602
U.S. Treasury Inflation Index Note, 0.250% January 15, 2025	41,021,078
U.S. Treasury Inflation Index Note, 0.375% July 15, 2027	40,257,662

U.S. Corporate Fixed Income

Holding	Fair Value
Towd Point Mortgage, Variable Rate October 25, 2059	\$6,474,953
Goldman Sachs Group Inc, 5.750% January 24, 2022	5,958,036
Goldman Sachs Group Inc, Variable Rate February 23, 2023	5,827,452
Bank of America Corp, Variable Rate December 20, 2028	5,129,934
JP Morgan Chase and Co, Variable Rate February 01, 2028	4,852,755
Morgan Stanley, 5.750%, January 25, 2021	4,673,565
BX Commercial Mortgage Trust 2019-XL, Variable Rate October 15, 2036	4,638,363
Verizon Communications Inc, 4.016% December 03, 2029	4,418,869
CHC Commercial Mortgage Trust 2019-CHC, Variable Rate June 15, 2034	3,960,354
AT&T Inc, 4.250% March 01, 2027	3,823,461

Note: A detailed list of SERS investment holdings as of December 31, 2019, may be viewed at www.sers.pa.gov.

INVESTMENT SECTION

Schedule of Trading Broker Commissions

December 31, 2019 (unaudited)

Broker commissions on equity and fixed income investment transactions for the year ended December 31, 2019 were \$1.9 million. Below is a list of brokers receiving commissions in excess of \$20,000 during the year.

Broker	Commissions	Broker	Commissions
Merrill Lynch	\$190,130	RBC Dominion Securities	\$57,758
Liquidnet	183,574	Sturdivant	50,507
Goldman Sachs	167,728	Jefferies and Company	49,624
JP Morgan Chase	95,619	Credit Suisse	42,544
UBS	89,912	Wells Fargo and Company	37,572
Citigroup	82,929	Mirae Asset Securities (USA) Inc	35,767
ISI Group Inc	82,872	HSBC Securities	32,902
Pershing	73,471	Stifel Nicolaus	26,837
Morgan Stanley Smith Barney	73,243	Loop Capital Markets	21,482
Nomura Group	68,734	Raymond James & Associates	21,172
CITIC	62,549		

Investment Summary

December 31, 2019 (unaudited)

The assets of SERS are administered by the board. The board adopted an investment policy that incorporates the provisions of the Retirement Code, which governs the investment of SERS' assets. SERS' investment plan is reviewed and updated regularly for strategic asset allocation purposes, as well as for diversification needs within each asset class.

Investments on the Statements of Fiduciary Net Position for financial reporting purposes are not based on the below asset allocation. The asset allocation is for investment reporting purposes only. As such, there may be differences between the Financial Section and the Investment Section.

Asset Allocation

(\$ millions)

Asset Class	Market Exposure	% of Total Fund	Long-Term 10-Year Strategic Target
Private Equity	\$4,070.6	13.1%	16.0%
Global Public Equity	17,163.9	55.2	48.0
Real Estate	2,117.3	6.9	12.0
Multi-Strategy	1,835.1	5.9	10.0
Legacy Hedge Funds	35.6	0.1	*
Fixed Income	4,375.5	14.1	11.0
Cash	1,471.4	4.7	3.0
Total Fund	\$31,069.4	100.0%	100.0%

*Legacy Hedge Funds asset class is in liquidation.

Number of Investment Managers

Asset Class	Investment Managers
Private Equity	61
Global Public Equity	14
Real Estate	27
Multi-Strategy	12
Legacy Hedge Funds	8
Fixed Income	9
Cash	1
Total Managers	132

Number of Investment Portfolios

Asset Class	Investment Portfolios
Private Equity	182
Global Public Equity	18
Real Estate	58
Multi-Strategy	16
Legacy Hedge Funds	8
Fixed Income	11
Cash	1
Total Portfolios	294

INVESTMENT SECTION

Investment Summary - Private Equity

December 31, 2019 (unaudited)

Role in the SERS Fund

SERS' Private Equity program seeks the highest return and growth opportunities, which capture market inefficiencies through active management in the private markets.

Program Structure

Investments in Private Equity are in the form of closed-end limited partnership interests. As an investor, SERS is a limited partner and does not have control of distributions in Private Equity investments. The investment horizon is typically seven or more years. SERS' Private Equity program endeavors to continue to build long-term strategic partnerships by investing in world class top-quartile funds. Private Equity investments commonly require commitments greater than seven years and therefore, must offer premium returns to compensate for illiquidity and risks.

SERS continues efforts to reduce the fees it incurs as a result of its investment in private equity funds/managers. The reduction of fees SERS has

experienced over the years is attributable to a number of initiatives including increasing its exposure to co-investment vehicles that carry no management or performance fees.

Objective

The objective of the Private Equity program is to generate annualized net-of-fee returns that exceed the total return of public equity markets by at least 3% (illiquidity premium) and exceed the mean return for the asset class over a seven- to 10-year period.

Performance is measured relative to the following benchmarks:

- Public Market Benchmark – Russell 3000 + 300 basis points (illiquidity premium)
- Private Market Benchmark – Burgiss All Private Equity Custom Index

Private Equity

(\$ millions)

	Unfunded Commitments	Fair Value	% of Total Fund
Core Sub-Asset Classes			
Buyout	\$1,612.8	\$1,981.4	6.4%
Special Situations	624.9	527.5	1.7
Venture Capital	291.5	816.6	2.6
Total Core Sub-Asset Classes	\$2,529.2	\$3,325.5	10.7
Non-Core Holdings^{1/}			
Keystone Legacy Fund	144.5	745.1	2.4
Total Private Equity	\$2,673.7	\$4,070.6	13.1%

^{1/}163 of SERS' Private Equity Holdings from each of the core sub-asset classes buyouts, special situations, and venture capital have been reclassified to non-core holdings to be managed through a special purpose vehicle, Keystone Legacy Fund. Currently, there are 145 holdings still in the Keystone Legacy Fund.

Investment Summary - Private Equity

December 31, 2019 (unaudited)

Portfolio Exposure

The Private Equity program is well diversified by sub-sector, geography, and industry focus. As of September 30, 2019, based on fair value, the program's exposure was:

By Fund Sub-Sector		By Geography^{2/}		By Industry^{2/}	
U.S. Private Equity	34.1%	United States	68.6%	Information Technology	32.7%
Non-U.S. ^{1/}	29.5	China	7.1	Financials	23.7
U.S. Venture Capital	20.4	South Korea	3.0	Consumer Discretionary	12.3
Distressed/Oppportunistic	10.9	India	2.6	Industrials	10.5
Pennsylvania-Related	5.1	United Kingdom	2.6	Health Care	8.3
		Germany	2.0	Telecommunication Services	3.3
		Brazil	1.4	Energy	2.5
		Rest of World	12.7	Consumer Staples	2.5
				Materials	2.1
				Real Estate	1.3
				Utilities	0.8

^{1/}Some managers with a domestic investment focus may invest globally. Thus, non-U.S. exposure measured on a portfolio company basis will be greater.

^{2/}Geography and industry are determined by the portfolio company.

INVESTMENT SECTION

Investment Summary - Private Equity

December 31, 2019 (unaudited)

The Capital Committed column represents total dollars allocated from SERS to each limited partnership. Accumulated Capital Drawn is the portion of SERS' Capital Commitments drawn by the general partner to be invested with underlying portfolio companies along with any reinvested capital. The Accumulated Distributions column shows the value of capital and profits returned to SERS.

Buyouts Committed, Drawn, and Distributed

Active Buyout Funds Limited Partnership	Strategy/Stage	SERS Initial Funding	Capital Committed ^{1/}	Accumulated Capital Drawn	Accumulated Distributions ^{2/}
1. ABRYS Partners IV	Middle	3/30/2001	\$27,242,773	\$25,497,290	\$74,633,973
ABRY Partners V	Middle	7/29/2005	45,000,000	41,742,771	83,293,903
ABRY Partners VI	Middle	3/26/2008	50,000,000	59,994,861	107,608,270
ABRY Partners VII	Middle	8/10/2011	30,000,000	37,911,447	48,786,607
ABRY Partners VIII	Middle	5/5/2015	25,000,000	28,902,579	11,828,459
2. Advent Latin American Private Equity Fund IV	Middle	8/2/2007	30,000,000	30,797,073	39,725,921
Advent International GPE VI-A	Large	7/7/2008	35,000,000	35,146,325	68,452,177
Advent Latin American Private Equity Fund V	Middle	7/5/2011	15,000,000	14,430,000	7,200,000
Advent International GPE VII-B	Large	12/6/2012	40,000,000	37,600,000	34,118,262
Advent Latin American Private Equity Fund VI	Middle	8/13/2015	25,000,000	18,925,000	5,000,000
Advent International GPE VIII-B	Large	9/26/2016	50,000,000	43,425,000	0
3. Apollo Investment Fund IV	Mega	9/30/1998	75,000,000	74,838,620	124,814,033
Apollo Investment Fund V	Mega	8/23/2001	50,000,000	44,972,146	122,507,048
Apollo Investment Fund VI	Mega	7/19/2006	40,000,000	38,911,805	64,467,407
Apollo Investment Fund IX	Mega	3/15/2019	85,400,000	8,174,793	884
4. Asia Alternatives Capital Partners	Fund of Funds	6/26/2007	25,000,000	25,190,179	41,760,199
Asia Alternatives Capital Partners II	Fund of Funds	3/7/2008	29,949,500	28,897,883	39,529,564
Asia Alternatives Korea Buyout Investors (Hahn & Co)	Fund of Funds	7/22/2011	7,000,000	8,660,726	9,137,898
Asia Alternatives Capital Partners III	Fund of Funds	8/3/2012	50,000,000	53,479,545	37,731,918
Penn Asia Investors	Fund of Funds	9/28/2012	133,000,000	82,365,187	38,994,901
Asia Alternatives Capital Partners V	Fund of Funds	10/5/2017	50,000,000	8,776,306	164,282
5. Audax Private Equity Fund	Middle	5/25/2000	35,000,000	36,839,098	56,057,910
Audax Private Equity Fund II	Middle	6/17/2005	25,000,000	25,517,152	45,240,610
Audax Private Equity Fund III	Middle	11/7/2007	37,000,000	42,498,691	80,644,845
Audax Private Equity Fund V	Middle	1/25/2016	50,000,000	38,611,369	15,078,628
Audax Private Equity Fund VI	Middle	8/29/2019	75,000,000	4,749,048	0
6. Berkshire Fund VI	Middle	7/11/2002	20,000,000	18,819,615	54,873,734
Berkshire Fund VII	Middle	11/15/2006	32,000,000	32,613,861	64,583,417
Berkshire Fund VIII	Middle	8/25/2011	30,000,000	30,644,097	29,785,272
7. Blackstone Communications Partners I	Mega	8/29/2000	25,000,000	25,114,042	30,998,189
Blackstone Capital IV	Mega	2/26/2003	69,379,875	69,119,097	192,545,287
Blackstone Capital Partners V	Mega	5/30/2006	150,000,000	150,105,421	242,138,440

Investment Summary - Private Equity

December 31, 2019 (unaudited)

Buyouts Committed, Drawn, and Distributed (continued)

	Active Buyout Funds Limited Partnership	Strategy/Stage	SERS Initial Funding	Capital Committed ^{1/}	Accumulated Capital Drawn	Accumulated Distributions ^{2/}
	Blackstone Capital Partners VII	Mega	10/21/2016	\$50,000,000	\$34,606,563	\$3,072,631
	Blackstone Capital Partners VIII	Mega	*	75,000,000	0	0
8.	Capvis Equity IV	Middle	1/30/2014	42,937,739	42,153,784	33,984,236
9.	Carlyle Energy Mezzanine Opportunities Fund	Small	9/5/2012	50,000,000	64,990,932	31,196,998
	Horizon Strategic Fund - Carlyle Group	Small	1/23/2014	100,000,000	86,306,150	37,610,457
10.	CVC Capital Partners VII	Mega	12/3/2018	91,762,589	14,786,945	390,578
11.	Energy Spectrum Partners V	Small	7/9/2007	27,660,592	27,661,855	51,598,933
12.	Eureka II	Growth Equity	1/30/2006	20,000,000	21,884,526	20,777,356
	Eureka Growth Capital III	Growth Equity	10/21/2013	20,000,000	14,652,268	13,614,722
13.	Francisco Partners	Middle	7/27/2000	50,000,000	47,769,948	61,464,903
	Francisco Partners II	Middle	7/10/2006	30,000,000	29,383,916	41,240,515
	Francisco Partners III	Middle	10/17/2011	20,000,000	20,514,684	33,151,148
	Francisco Partners IV	Middle	4/15/2015	25,000,000	24,656,280	13,481,280
14.	FSN Capital IV	Middle	12/19/2013	37,899,972	37,755,593	49,991,515
	FSN Capital V	Middle	1/4/2017	78,439,928	42,637,310	7,278,360
15.	GTCR VIII	Middle	7/7/2003	75,000,000	69,393,599	120,471,948
	GTCR IX	Middle	12/1/2006	50,000,000	47,916,718	86,149,702
	GTCR Fund XI	Middle	9/2/2014	25,000,000	22,337,831	17,208,220
	GTCR Fund XII	Large	5/4/2018	32,500,000	8,372,000	585,073
16.	Great Hill Equity Partners III	Middle	3/7/2006	35,000,000	35,000,000	41,935,541
	Great Hill Equity Partners IV	Middle	9/8/2008	25,000,000	25,125,662	56,840,270
17.	H.I.G. Growth Buyouts & Equity Fund II	Growth Equity	7/20/2011	15,000,000	14,656,287	4,086,778
	H.I.G. Europe Capital Partners II	Small	1/10/2014	24,366,416	16,364,744	3,985,287
	H.I.G. Brazil and Latin America Partners	Middle	8/12/2015	50,000,000	20,988,594	9,139
18.	Hahn & Company II	Middle	5/29/2015	50,000,000	49,578,055	9,040,888
	Hahn & Company III	Middle	12/20/2018	56,250,000	10,540,423	49,788
	Hahn & Company III - Supplemental Fund	Middle	12/20/2018	18,750,000	6,522,799	34,031
19.	HarbourVest IPEP III	Fund of Funds	6/30/1998	40,000,000	39,400,000	61,092,165
	HIPEP V-Asia Pacific & Rest of World	Fund of Funds	5/9/2006	30,000,000	28,245,316	34,879,197
	Horizon Impact Fund	Fund of Funds	10/24/2014	50,000,000	40,504,802	20,795,776
	Horizon Impact Fund B	Fund of Funds	5/31/2017	100,000,000	38,750,000	0
20.	Hellman & Friedman Capital Partners VI	Large	6/5/2007	125,000,000	119,913,412	218,914,920
	Hellman & Friedman Capital Partners VIII	Large	9/1/2016	50,000,000	50,286,952	4,699,979
	Hellman & Friedman Capital Partners IX	Large	*	90,000,000	0	0

INVESTMENT SECTION

Investment Summary - Private Equity

December 31, 2019 (unaudited)

Buyouts Committed, Drawn, and Distributed (continued)

	Active Buyout Funds Limited Partnership	Strategy/Stage	SERS Initial Funding	Capital Committed ^{1/}	Accumulated Capital Drawn	Accumulated Distributions ^{2/}
21.	Incline Equity Partners III	Small	1/14/2013	\$15,000,000	\$15,701,555	\$20,874,842
22.	Kelso VII	Middle	10/18/2004	40,000,000	41,194,550	65,845,731
	Kelso VIII	Middle	11/29/2007	150,000,000	146,269,405	164,521,918
23.	LLR Equity Partners II	Middle	1/29/2004	25,000,000	25,000,000	44,945,591
	LLR Equity Partners III	Middle	7/24/2008	30,000,000	29,108,722	51,222,009
	LLR Equity Partners IV	Middle	3/14/2014	50,000,000	45,485,764	48,368,421
	LLR Equity Partners V	Middle	3/21/2018	75,000,000	38,522,917	2,706,267
24.	Madison Dearborn Capital Partners IV	Middle	4/2/2001	90,000,000	90,365,390	169,072,775
	Madison Dearborn Capital Partners V	Middle	12/14/2006	75,000,000	71,558,278	113,628,059
	Madison Dearborn Capital Partners VI	Middle	5/27/2008	50,000,000	51,139,430	84,688,770
25.	NGP XII	Large	11/14/2018	75,000,000	24,128,547	113,471
	NGP Keystone	Large	*	25,000,000	0	0
26.	OCM/GFI Power Opportunities Fund II	Small	5/9/2005	13,431,284	13,470,852	41,644,215
	Oaktree Power Opportunities Fund III	Middle	10/18/2010	25,000,000	18,453,089	23,437,650
27.	Permira European Fund II	Large	6/7/2000	45,672,612	45,672,612	91,464,087
	Permira European Fund III	Large	1/12/2004	127,062,518	127,340,454	217,778,356
	Permira IV	Large	12/14/2006	136,376,290	137,762,438	203,511,684
	Permira VI	Large	1/10/2017	56,692,537	44,369,051	0
	Permira VII	Mega	*	75,173,376	0	0
28.	Primavera Capital Fund II	Large	11/17/2015	50,000,000	52,132,478	3,728,092
	Primavera Capital Fund III	Middle	4/12/2019	75,000,000	37,525,121	227,335
29.	Providence Equity Partners IV	Large	11/27/2000	25,000,000	23,420,840	56,065,270
	Providence Equity Partners V	Large	4/4/2005	45,000,000	42,692,171	51,743,883
	Providence Equity Partners VI	Large	3/16/2007	50,000,000	53,946,228	58,171,556
30.	Ridgemont Equity Partners II	Small	11/30/2015	50,000,000	47,405,136	15,029,495
31.	Sentinel Capital Partners V	Middle	7/15/2014	10,000,000	10,043,414	5,527,616
32.	Silver Lake Partners V	Large	6/12/2018	78,000,000	31,690,894	20,220
33.	Sterling Group Partners IV	Middle	6/15/2016	20,000,000	13,017,042	471,052
34.	TA X	Middle	4/25/2006	70,000,000	69,732,009	90,382,009
35.	TDR Capital IV	Middle	11/16/2018	89,770,683	1,823,120	0
36.	Thoma Bravo Fund XIII	Mega	2/14/2019	75,000,000	27,077,759	303
37.	TPG Partners III	Mega	1/13/2000	64,375,746	64,119,169	165,990,273
	TPG Partners IV	Mega	12/29/2003	27,907,484	27,981,463	57,968,285
	Newbridge Asia IV	Middle	9/27/2005	40,000,000	38,903,378	85,845,344
	TPG Partners V	Mega	6/27/2006	88,831,038	92,531,812	126,478,952
	TPG Asia V	Large	2/19/2008	22,500,000	21,964,311	26,454,835
	TPG Partners VI	Mega	5/22/2008	44,294,641	50,111,214	65,169,482

Investment Summary - Private Equity

December 31, 2019 (unaudited)

Buyouts Committed, Drawn, and Distributed (continued)

Active Buyout Funds Limited Partnership	Strategy/Stage	SERS Initial Funding	Capital Committed ^{1/}	Accumulated Capital Drawn	Accumulated Distributions ^{2/}
38. TSG8	Middle	*	\$100,000,000	\$1,980,930	\$0
39. Vista Equity Partners Fund VI	Large	12/29/2016	150,000,000	163,996,355	35,980,028
Vista Equity Partners Fund VII	Large	2/13/2019	75,000,000	13,269,481	36,021
40. Wind Point Partners VIII	Small	9/14/2017	100,000,000	68,991,365	48,554,180
Wind Point Partners IX-A	Middle	*	75,000,000	562,500	0
Total Active Buyouts			\$5,731,627,593	\$4,297,390,219	\$5,089,002,449

Cash flows as of September 30, 2019.

*Not funded as of September 30, 2019.

^{1/}Commitments as of December 31, 2019.

^{2/}Distributions include stock distributions. Distributions may include fees that are recorded as negative distributions to be offset against future distributions of the underlying limited partnership investment.

INVESTMENT SECTION

Investment Summary - Private Equity

December 31, 2019 (unaudited)

The Capital Committed column represents total dollars allocated from SERS to each limited partnership. Accumulated Capital Drawn is the portion of SERS' Capital Commitments drawn by the general partner to be invested with underlying portfolio companies along with any reinvested capital. The Accumulated Distributions column shows the value of capital and profits returned to SERS.

Special Situations Committed, Drawn, and Distributed

Active Special Situations Funds Limited Partnership	Strategy/Stage	SERS Initial Funding	Capital Committed ^{1/}	Accumulated Capital Drawn	Accumulated Distributions ^{2/}
1. ABRY Mezzanine Partners	Mezzanine	3/15/2002	\$30,000,000	\$26,731,187	\$49,707,116
ABRY Senior Equity II	Mezzanine	7/27/2006	30,000,000	28,282,103	44,960,375
ABRY Advanced Securities Fund	Distressed/Restructuring	8/1/2008	7,262,950	23,508,684	38,682,209
2. ADV Opportunities Fund I	Distressed/Restructuring	10/5/2015	50,000,000	53,820,000	7,523,774
3. AXA Secondary Fund III	Secondaries	11/19/2004	26,000,000	21,737,894	37,244,706
AXA Secondary Fund III-2	Secondaries	11/24/2004	14,000,000	11,677,210	19,062,764
AXA Secondary Fund IV	Secondaries	2/26/2007	80,000,000	70,134,752	99,186,788
AXA Secondary Fund V B	Secondaries	6/19/2012	75,000,000	61,682,742	87,999,708
ASF VII B	Secondaries	2/19/2016	100,000,000	38,680,550	7,537,020
ASF VII PA Co-Invest	Secondaries	5/18/2016	50,000,000	24,138,733	998,004
ASF VIII B	Secondaries	6/13/2019	100,000,000	10,000	0
ASF VIII PA Co-Invest	Secondaries	*	50,000,000	0	0
4. Avenue Special Situations Fund VI	Distressed/Restructuring	11/2/2010	20,000,000	20,068,464	20,720,289
5. Centerbridge Capital Partners I	Distressed/Restructuring	2/27/2007	50,000,000	57,490,446	113,475,526
Centerbridge Capital Partners III	Distressed/Restructuring	5/21/2015	30,000,000	19,320,874	6,196,230
6. Clearlake Capital Partners IV	Distressed/Restructuring	9/1/2015	15,000,000	19,224,689	12,443,362
Clearlake Capital Partners V	Distressed/Restructuring	2/1/2018	55,000,000	35,487,996	6,860,078
Clearlake Capital Partners VI	Distressed/Restructuring	*	75,000,000	0	0
7. H.I.G. Bayside Debt & LBO Fund II	Distressed/Restructuring	6/17/2008	30,000,000	30,996,778	45,748,556
H.I.G. Bayside Loan Opp. Fund III	Distressed/Restructuring	6/12/2013	50,000,000	40,418,122	35,141,918
H.I.G. Bayside Loan Opp. Fund IV	Distressed/Restructuring	1/16/2015	25,000,000	17,671,163	11,077,133
8. Dover Street VII	Secondaries	7/2/2008	30,000,000	28,696,128	38,618,229
9. KPS Special Situations Fund IV	Distressed/Restructuring	5/8/2014	25,000,000	21,124,707	7,183,287
KPS Special Situations Mid-Cap Fund	Distressed/Restructuring	*	25,000,000	0	0
KPS Special Situations Fund V	Distressed/Restructuring	*	75,000,000	0	0

Investment Summary - Private Equity

December 31, 2019 (unaudited)

Special Situations Committed, Drawn, and Distributed (continued)

Active Special Situations Funds Limited Partnership	Strategy/Stage	SERS Initial Funding	Capital Committed ^{1/}	Accumulated Capital Drawn	Accumulated Distributions ^{2/}
10. LBC Credit Partners III	Mezzanine	3/4/2013	\$50,000,000	\$46,706,483	\$45,629,006
11. Lexington Capital Partners III	Secondaries	1/26/1999	35,000,000	34,516,449	43,363,378
Lexington Capital Partners V	Secondaries	1/17/2002	75,000,000	74,623,418	125,170,164
Lexington Capital Partners VI	Secondaries	10/21/2005	50,000,000	53,066,325	69,764,016
12. Oaktree Capital Management	Distressed/Restructuring	5/28/2004	40,000,000	40,582,060	138,695,599
OCM Opportunities Fund V	Distressed/Restructuring	8/12/2004	40,000,000	40,003,507	65,911,274
OCM Opportunities Fund VI	Distressed/Restructuring	9/28/2005	40,000,000	40,000,000	63,171,009
OCM Principal Opportunities Fund IV	Distressed/Restructuring	1/24/2007	20,000,000	20,400,000	34,019,822
OCM Opportunities Fund VII	Distressed/Restructuring	5/16/2007	40,000,000	40,000,000	53,450,728
OCM Opportunities Fund VII b	Distressed/Restructuring	6/3/2008	40,000,000	36,000,000	61,488,034
OCM Opportunities Fund VIII	Distressed/Restructuring	9/20/2010	12,500,000	12,583,425	17,430,778
OCM Opportunities Fund VIII b	Distressed/Restructuring	8/22/2011	12,500,000	12,500,000	12,123,310
Oaktree Opportunities Fund IX	Distressed/Restructuring	3/26/2013	50,000,000	50,000,000	21,447,715
13. Platinum Equity Capital Partners III	Distressed/Restructuring	8/5/2013	50,000,000	45,516,573	61,596,689
14. RRJ Capital Master Fund III	Distressed/Restructuring	12/10/2015	50,000,000	37,677,396	23,851,749
Total Active Special Situations			\$1,722,262,950	\$1,235,078,858	\$1,527,480,343

Cash flows as of September 30, 2019.

*Not funded as of September 30, 2019.

^{1/}Commitments as of December 31, 2019.

^{2/}Distributions include stock distributions. Distributions may include fees that are recorded as negative distributions to be offset against future distributions of the underlying limited partnership investment.

INVESTMENT SECTION

Investment Summary - Private Equity

December 31, 2019 (unaudited)

The Capital Committed column represents total dollars allocated from SERS to each limited partnership. Accumulated Capital Drawn is the portion of SERS' Capital Commitments drawn by the general partner to be invested with underlying portfolio companies along with any reinvested capital. The Accumulated Distributions column shows the value of capital and profits returned to SERS.

Venture Capital Committed, Drawn, and Distributed

Active Venture Capital Funds Limited Partnership	Strategy/Stage	SERS Initial Funding	Capital Committed ^{1/}	Accumulated Capital Drawn	Accumulated Distributions ^{2/}
1. Battery Ventures VIII	Balanced	8/13/2007	\$25,000,000	\$25,050,751	\$55,636,614
Battery Ventures VIII Side Car Fund	Balanced	8/29/2008	6,768,000	6,803,790	17,449,466
2. HarbourVest Partners VI	Fund of Funds	5/7/1999	200,000,000	196,586,055	251,049,275
HarbourVest Partners VII	Fund of Funds	3/24/2003	75,000,000	73,687,500	105,817,387
HarbourVest Partners VIII	Fund of Funds	10/5/2006	100,000,000	98,000,000	133,926,786
3. Insight Venture Partners VI	Growth Equity	8/21/2007	30,000,000	32,244,177	78,429,161
Insight Venture Partners VII	Growth Equity	4/27/2011	20,000,000	21,319,992	43,195,215
Insight Venture Partners VIII	Growth Equity	7/10/2013	50,000,000	52,250,000	67,015,119
Insight Venture Partners IX	Growth Equity	3/24/2015	50,000,000	49,250,000	8,503,088
Insight Venture Partners X	Growth Equity	4/17/2018	100,000,000	71,000,000	34,245
Insight Venture Partners XI	Growth Equity	*	75,000,000	0	0
4. JMI Equity Fund VI	Growth Equity	6/27/2007	40,000,000	40,000,246	67,630,800
JMI Equity Fund VII	Growth Equity	2/14/2011	10,000,000	9,780,000	12,440,582
JMI Equity Fund VIII	Growth Equity	10/1/2015	25,000,000	26,600,000	11,546,162
5. Lightspeed Venture Partners VII	Early Stage	2/27/2006	18,000,000	18,000,000	49,449,448
Lightspeed Venture Partners VIII	Early Stage	6/27/2008	15,000,000	14,700,000	28,841,454
Lightspeed India Partners I	Early Stage	8/14/2015	15,000,000	13,155,000	0
6. Meritech Capital Partners III	Late Stage	4/5/2006	35,000,000	35,000,000	190,791,007
Meritech Capital Partners IV	Late Stage	2/10/2011	20,000,000	19,400,000	26,428,350
Meritech Capital Partners V	Late Stage	9/3/2014	23,000,000	21,332,500	5,531,882
7. New Enterprise Associates IX	Early Stage	11/15/1999	20,000,000	19,600,000	7,978,301
New Enterprise Associates X	Early Stage	12/11/2000	35,000,000	35,028,000	33,995,586
New Enterprise Associates 11	Early Stage	3/1/2004	25,000,000	25,000,000	62,741,850
New Enterprise Associates 12	Early Stage	6/26/2006	35,000,000	35,631,130	45,743,461
8. NewSpring Growth Capital II	Growth Equity	4/20/2007	10,000,000	9,850,000	13,962,639
NewSpring Growth Capital III	Growth Equity	7/27/2012	25,000,000	23,361,239	10,192,997
9. Providence Strategic Growth II	Growth Equity	12/7/2016	60,000,000	65,575,025	44,554,278
Providence Strategic Growth III	Growth Equity	7/26/2018	75,000,000	54,092,696	10,914,743
Providence Strategic Growth IV	Growth Equity	*	75,000,000	0	0

Investment Summary - Private Equity

December 31, 2019 (unaudited)

Venture Capital Committed, Drawn, and Distributed (continued)

Active Venture Capital Funds Limited Partnership	Strategy/Stage	SERS Initial Funding	Capital Committed ^{1/}	Accumulated Capital Drawn	Accumulated Distributions ^{2/}
10. T.Rowe Price Stock Distribution Account ^{3/}	Late Stage	1/3/2005	\$0	\$1,057,654,552	\$1,060,037,699
11. TCV X	Growth Equity	5/17/2019	75,000,000	24,735,000	0
12. Weathergage Venture Capital	Fund of Funds	6/26/2007	25,000,000	22,875,000	30,661,174
Weathergage Venture Capital II	Fund of Funds	6/29/2010	25,000,000	23,250,000	14,474,675
Total Active Venture Capital			\$1,417,768,000	\$2,220,812,653	\$2,488,973,444

Cash flows as of September 30, 2019.

*Not funded as of September 30, 2019.

^{1/}Commitments as of December 31, 2019.

^{2/}Distributions include stock distributions. Distributions may include fees that are recorded as negative distributions to be offset against future distributions of the underlying limited partnership investment.

^{3/}T. Rowe Price acts as a stock liquidation account. All cash and stock distributions are reflected in the corresponding distributions.

INVESTMENT SECTION

Investment Summary - Private Equity

December 31, 2019 (unaudited)

The Capital Committed column represents total dollars allocated from SERS to each limited partnership. Accumulated Capital Drawn is the portion of SERS' Capital Commitments drawn by the general partner to be invested with underlying portfolio companies along with any reinvested capital. The Accumulated Distributions column shows the value of capital and profits returned to SERS.

Legacy Private Equity Committed, Drawn, and Distributed

Legacy Private Equity Funds Limited Partnership	Strategy/Stage	SERS Initial Funding	Capital Committed ^{1/}	Accumulated Capital Drawn	Accumulated Distributions ^{2/}
1. Keystone Legacy Non-Core Fund ^{3/}	Various	7/1/2018	\$5,016,504,405	\$5,023,155,054	\$6,325,724,876
Total Legacy Private Equity			\$5,016,504,405	\$5,023,155,054	\$6,325,724,876

Cash flows as of September 30, 2019.

^{1/}Commitments as of September 30, 2019.

^{2/}Distributions include stock distributions. Distributions may include fees that are recorded as negative distributions to be offset against future distributions of the underlying limited partnership investment.

^{3/}A total of 145 legacy holdings from the Private Equity core sub-asset classes (Buyouts, Special Situations, and Venture Capital) make up the Keystone Legacy Fund, a special purpose vehicle which is managed by a third-party.

Investment Summary - Global Public Equity

December 31, 2019 (unaudited)

Role in the SERS Fund

SERS' Global Public Equity program seeks high returns through capital appreciation and income from dividend payments while also improving the total fund's liquidity. SERS' Global Public Equity program contributes a high expected long-term return to the fund but also may be the greatest contributor to near-term volatility.

Program Structure

Investments in public equity are achieved through buying and holding publicly-traded securities of companies throughout the developed world and in emerging markets. These companies exhibit a wide range of market capitalizations in many industries and sectors, and offer vastly different equity return opportunities.

Consistent with continuing cost reduction efforts, SERS has successfully lowered the overall cost of this program by increasing its exposure to index strategies and consolidating portfolios.

Objective

The objective of the Global Public Equity program is to generate annualized net-of-fee returns that exceed its benchmark, the MSCI All Country World Investable Market Index, over a three- to five-year period.

INVESTMENT SECTION

Investment Summary - Global Public Equity

December 31, 2019 (unaudited)

Global Public Equity

(\$ millions)

Manager	Investment Style	Market Exposure as of 12/31/19 ^{4/}
Global Mandates		
1. Walter Scott & Partners Limited	Global Growth	\$1,135.0
Total Global Mandates		1,135.0
U.S. Equity		
2. Emerald Advisers	Small-cap growth	734.7
3. Mellon Capital Management Russell 1000 Index	Russell 1000 Index	6,312.0
Mellon Capital Management Russell 2000 Core Index	Russell 2000 Core	348.2
Mellon Capital Management Russell 2000 Value Index	Russell 2000 Value	621.6
Total U.S. Equity		8,016.5
Non-U.S. Developed Markets Equity		
4. Artisan Partners - Global ex U.S.	Global ex-U.S. growth	0.8
5. BlackRock MSCI World ex U.S. Index	Developed ex-U.S. Index	5,125.0
6. Harris Associates	Small-cap value	636.2
Mellon Capital Management MSCI World ex U.S. Index	MSCI World ex-U.S. Index	6.3
7. Morgan Stanley Investment Management Limited-developed ex U.S.	EAFE value	0.8
8. Templeton Investment Counsel - Global ex U.S.	Global ex-U.S. value	1.0
9. FIS Group	International Small-cap	214.2
Total Non-U.S. Developed Markets Equity		5,984.3
Emerging Markets Equity		
BlackRock/Emerging Markets Index Fund	MSCI Emerging Markets Index	737.3
10. GlobeFlex Capital	Small-cap - GARP	96.6
11. Macquarie Emerging Markets	Mid/large cap value	467.6
12. Martin Currie Investment Management	All-cap	488.9
13. Leading Edge Investment Advisors	Emerging Markets	236.4
Total Emerging Markets Equity		2,026.8
Transition Assets		
14. Northern Trust	Transition	1.3
Total Transition Assets		1.3
Total Global Public Equity		\$17,163.9

^{4/}Includes securities and cash, which the manager had available for investment.

Investment Summary - Real Estate

December 31, 2019 (unaudited)

Role in the SERS Fund

Real Estate has several roles within SERS' overall investment portfolio, including enhancing returns and providing diversification, income, and an inflation hedge. As in the past, SERS has emphasized a balance between value-add/opportunistic real estate strategies which can provide competitive total returns through capital appreciation, and core/core plus strategies, which have a larger emphasis on income, and in many cases, increased liquidity. SERS will seek to achieve this balanced risk profile by focusing on top-tier managers in each aspect of Real Estate, which is expected to result in attractive, long-term risk-adjusted returns.

Program Structure

Investments in Real Estate are categorized into four strategies: core/core plus, value-add and opportunistic, real estate securities, and natural resources/infrastructure related strategies and funds. SERS will build its Real Estate allocation towards its long-term target by steadily increasing investments in both relatively stable, core/core plus investments as well as value-add and opportunistic strategies. Target allocations within the Real Estate program are

designed to balance expected return, liquidity, diversification, and inflation hedging, while decreasing expected risk. SERS' Real Estate program is subject to the investment pacing established by the investment plan to help manage the liquidity profile of the total fund to align with the projected increase in retirement benefit payments.

As part of this structure, the SERS Investment Office has found success in negotiating favorable economic terms and establishing side-car, co-investment vehicles, to lower investment costs.

Objective

The objective of the Real Estate program is to generate annualized net-of-fee returns that exceed a custom benchmark (NCREIF Fund Index - Open End Diversified Core Equity, FTSE NAREIT U.S. Real Estate Index for real estate securities, & CPI plus a 3% premium for natural resources/infrastructure, with the various components weighted according to long-term allocation targets within the asset class), over a seven- to 10-year period.

Real Estate

(\$ millions)

Sub-Asset Class	Fair Value	% of Total Fund
Core/Core Plus ^{1/}	\$741.3	2.4%
Value Add/Opportunistic SMA	638.9	2.1
Value Add/Opportunistic Funds ^{2/}	447.8	1.5
Natural Resources/Infrastructure	5.7	0.0
Real Estate Securities	283.6	0.9
Total Real Estate	\$2,117.3	6.9%

^{1/}As of December 31, 2019, unfunded commitments are \$386.5 million.

^{2/}As of December 31, 2019, unfunded commitments are \$559.0 million.

INVESTMENT SECTION

Investment Summary - Real Estate

December 31, 2019 (unaudited)

The Capital Committed column represents total dollars allocated from SERS to each fund/manager. Accumulated Capital Drawn is the portion of SERS' Capital Commitments drawn by the fund/manager to be invested. This amount may also include recycled capital (capital that was distributed and later recalled by the manager to be reinvested) as well as manager fees paid outside of the fund. The Accumulated Distributions column shows the value of capital and profits returned to SERS.

Real Estate

Fund / Manager	Asset Type	SERS Initial Funding	Capital Committed ^{1/}	Accumulated Capital Drawn	Accumulated Distributions
Core Real Estate					
1. Heitman America Real Estate Trust	Diversified	2007	\$100,000,000	\$100,000,000	\$77,826,961
2. UBS Trumbull Property Fund	Diversified	1988	25,558,525	25,558,525	109,004,302
Total Core Real Estate			125,558,525	125,558,525	186,831,263
Core-Plus Real Estate					
3. Blackstone Property Partners	Diversified	2017	300,000,000	300,000,000	1,744,007
4. Henderson Park Enhanced Income Fund	Diversified	2019	321,722,630	189,808,430	0
5. Oak Street Real Estate Capital Net Lease Property Fund	Diversified	2019	300,000,000	16,681,270	576,482
Total Core-Plus Real Estate			921,722,630	506,489,700	2,320,489
Value Add/Oppportunistic Funds					
6. Activum SG Fund VI	Diversified	*	54,510,000	0	0
Activum SG Fund VI Pennsylvania Side-Car	Diversified	*	54,510,000	0	0
7. AG Asia Realty Fund	Diversified	2007	25,000,000	23,500,000	25,187,500
8. Berwind Investment Partnership VI	Diversified	2002	24,543,712	24,543,712	41,584,267
Berwind Investment Partnership VII	Diversified	2005	25,000,000	25,000,000	13,134,347
Berwind Investment Partnership VIII	Diversified	2007	15,588,238	14,912,018	19,916,719
Berwind Investment Partnership IX	Diversified	2012	25,000,000	24,303,409	36,150,315
Blackstone Real Estate Partners IV	Diversified	2003	25,000,000	25,000,000	39,865,646
Blackstone Real Estate Partners V	Diversified	2006	50,000,000	47,912,974	95,150,783
Blackstone Real Estate Partners VI	Diversified	2007	75,000,000	71,319,075	148,786,302
Blackstone Real Estate Partners VII	Diversified	2011	75,000,000	64,503,300	86,678,009
9. Blue Moon Senior Housing II	Senior Housing	*	50,000,000	0	0
Blue Moon Senior Housing II Sidecar	Senior Housing	*	50,000,000	0	0
10. C-III Recovery Fund III	Diversified	2017	100,000,000	49,357,034	0
11. Clerestory Small Cap Fund I	Diversified	2010	18,000,000	15,228,956	15,131,513
12. Colony Investors VIII	Diversified	2007	22,500,000	21,655,800	7,962,017

INVESTMENT SECTION

Investment Summary - Real Estate

December 31, 2019 (unaudited)

Real Estate (continued)

Fund / Manager	Asset Type	SERS Initial Funding	Capital Committed ^{1/}	Accumulated Capital Drawn	Accumulated Distributions
13. Hawkeye Scout Fund I	Diversified	2009	\$75,000,000	\$75,000,000	\$116,815,057
Hawkeye Scout Fund II	Diversified	2016	30,000,000	27,630,079	503,612
14. LEM Real Estate High-Yield Debt Fund III	Debt	2013	25,000,000	25,000,000	45,430,485
15. Lubert Adler Fund III	Diversified	2000	30,000,000	30,000,000	45,177,542
Lubert Adler Fund IV	Diversified	2004	25,000,000	26,500,000	14,930,514
Lubert Adler Fund V	Diversified	2006	30,000,000	30,621,958	11,375,984
Lubert Adler Fund VI	Diversified	2008	20,927,116	19,880,760	18,915,875
Lubert Adler Fund VII	Diversified	2014	25,000,000	22,820,446	8,170,946
16. Mesirow Financial Real Estate Value Fund III	Diversified	2018	25,145,833	15,816,520	312,695
Oak Street Real Estate Fund IV	Diversified	2017	100,000,000	48,173,256	3,069,251
17. Prudential Latin America Retail Fund I	Retail	2006	2,271,117	2,271,117	8,162,626
Prudential Latin America Residential Fund III	Multi-Family	2008	29,654,968	24,708,749	13,444,991
Prudential Senior Housing Fund IV	Senior Housing	2011	22,089,297	20,799,516	18,145,530
Prudential Senior Housing Fund V	Senior Housing	2015	50,000,000	38,984,487	2,936,071
Prudential Senior Housing Fund VI	Senior Housing	2019	100,000,000	7,402,701	0
18. Rockpoint Finance Fund I	Residential Land	2007	2,527,500	2,527,500	2,106,094
Rockpoint Real Estate Fund II	Diversified	2005	34,138,784	34,138,784	30,679,156
Rockpoint Real Estate Fund III	Diversified	2007	50,632,887	46,391,722	66,888,445
Rockpoint Real Estate Fund V	Diversified	2015	50,000,000	36,937,819	5,062,127
19. Singerman III	Diversified	2017	50,000,000	16,500,000	0
Singerman III Select	Diversified	2017	50,000,000	3,875,000	0
20. Starwood Fund VI	Diversified	2001	50,000,000	50,153,525	51,782,742
Starwood Fund VII	Diversified	2006	35,000,000	35,000,000	27,295,581
Starwood Fund VIII	Diversified	2009	50,000,000	45,356,281	68,465,826
21. ValStone Opportunity Fund V	Diversified	2014	14,663,402	14,663,402	3,209,834
22. Westbrook Fund V	Diversified	2004	25,000,000	25,000,000	44,485,779
Westbrook Fund VI	Diversified	2006	35,000,000	35,000,000	37,571,397
Westbrook Fund VII	Diversified	2007	50,000,000	50,000,000	52,787,877
Westbrook Fund VIII	Diversified	2009	50,000,000	50,000,000	63,418,319
Total Value Add/Oppportunistic Funds			1,826,702,854	1,268,389,900	1,290,691,774

INVESTMENT SECTION

Investment Summary - Real Estate

December 31, 2019 (unaudited)

Real Estate (continued)

Fund / Manager	Asset Type	SERS Initial Funding	Capital Committed ^{1/}	Accumulated Capital Drawn	Accumulated Distributions
Value Add/Oppportunistic SMA^{2/}					
Heitman I.M.A.	Diversified	1988	NA	\$813,635,039	\$1,092,759,873
23. LaSalle I.M.A.	Diversified	1994	NA	444,715,936	778,848,456
LaSalle Takeover I.M.A.	Diversified	2018	NA	236,217,434	9,885,602
24. hotelAVE I.M.A.	Hotel	2018	NA	59,048,685	19,191,396
25. Lowe I.M.A.	Diversified	1994	NA	715,229,496	1,070,987,833
Lowe GTO	Diversified	2012	NA	349,069,212	369,841,373
Total Value Add/Oppportunistic SMA			NA	2,617,915,802	3,341,514,533
Natural Resources/Infrastructure^{2/}					
26. Forest I.M.A.	Timberland	1992	NA	124,231,969	242,567,376
Total Natural Resources/Infrastructure			NA	124,231,969	242,567,376
REITs^{2/}					
27. CenterSquare Real Estate Securities	Diversified	2002	NA	183,616,773	36,168,336
Total REITs			NA	183,616,773	36,168,336
Total Real Estate			\$2,873,984,009	\$4,826,202,669	\$5,100,093,771

Cash flows as of September 30, 2019.

*Not funded as of September 30, 2019.

^{1/}Commitments as of December 31, 2019.

^{2/}Due to the nature of the investments, there are no capital commitments for value add/opportunistic SMA, natural resources/infrastructure, and real estate securities managers.

Investment Summary - Multi-Strategy

December 31, 2019 (unaudited)

Role in the SERS Fund

SERS' Multi-Strategy program was structured to provide attractive long-term returns, which capture market inefficiencies through active management in multiple markets. Multi-Strategy increases investment flexibility to invest in strategies with high return generating potential which may not fit the characteristics of other asset classes.

Program Structure

SERS' Multi-Strategy program invested in a diverse set of strategies including distressed debt, direct

lending, structured credit, niche credit, and opportunistic equity. The program is less liquid than traditional strategies.

Objective

The objective of the Multi-Strategy program was to generate annualized net-of-fee returns that exceed the public equity market over a long-term period but with lower volatility and beta to traditional markets, measured by recession to recession. The benchmark is the S&P/LSTA Leveraged Loan Index.

Multi-Strategy

(\$ millions)

Sub-Asset Class	Fair Value	% of Total Fund
Private Credit Funds ^{1/}	\$305.7	1.0%
Credit-Focused Strategies	969.8	3.1
Opportunistic Equity & Fixed Income	559.6	1.8
Total Multi-Strategy	\$1,835.1	5.9%

^{1/}As of December 31, 2019, unfunded commitments are \$1,197.3 million.

SERS' 2020 strategic investment strategy will phase out this asset class. A separate private credit portfolio has been established with a 4% long-term fund target.

INVESTMENT SECTION

Investment Summary - Multi-Strategy

December 31, 2019 (unaudited)

Private Markets

The capital committed column represents total dollars allocated from SERS to each limited partnership. Accumulated capital drawn is the portion of SERS' capital commitments drawn by the general partner to be invested with underlying portfolio companies along with any reinvested capital. The accumulated distributions column shows the value of capital and profits returned to SERS.

Private Credit Committed, Drawn, and Distributed

Active Private Credit Funds	Strategy/Stage	SERS Initial Funding	Capital Committed ^{1/}	Accumulated Capital Drawn	Accumulated Distributions ^{2/}
1. Apollo Hybrid Value Fund	Distressed and Credit	12/24/2018	\$100,000,000	\$16,840,978	\$109,027
2. Ares Special Opportunities Fund	Distressed/ Restructuring	*	70,000,000	0	0
3. Audax Direct Lending Solutions Fund-A	Direct Lending	10/26/2018	100,000,000	24,820,717	3,052,790
4. Brightwood Capital Fund IV	Direct Lending	4/24/2018	100,000,000	90,000,000	4,981,224
5. Clearlake Opportunity Partners II	Direct Lending	8/30/2019	75,000,000	6,101,384	4,017
6. Glendon Opportunities Fund II	Distressed and Credit	*	150,000,000	0	0
7. ICG Europe Fund VII	Distressed and Credit	8/24/2018	90,030,142	25,356,710	12,206
ICG North American Private Debt Fund II	Distressed and Credit	2/27/2019	50,000,000	5,198,414	228,019
ICG Europe Mid-Market Fund	Distressed and Credit	*	75,173,376	0	0
8. Permira Credit Solutions IV Master (Feeder) SCSp	Direct Lending	9/26/2019	75,000,000	3,900,000	0
9. TSSP Adjacent Opportunities Partners (B)	Distressed and Credit	11/9/2017	100,000,000	57,397,790	7,680,024
TSSP Opportunities Partners IV	Distressed and Credit	1/25/2019	50,000,000	8,088,859	9,829
TSSP Adjacent Opportunities Partners (D)	Distressed and Credit	*	150,000,000	105,477	0
Total Active Private Credit Funds			\$1,185,203,518	\$237,810,329	\$16,077,136

Cash flows as of September 30, 2019.

*Not funded as of September 30, 2019.

^{1/}Commitments as of December 31, 2019.

^{2/}Distributions include stock distributions. Distributions may include fees that are recorded as negative distributions to be offset against future distributions of the underlying limited partnership investment.

INVESTMENT SECTION

Investment Summary - Multi-Strategy

December 31, 2019 (unaudited)

Public Markets

	Manager	Investment Style	Market Exposure as of 12/31/19 ^{1/} (\$ millions)
Credit-Focused Strategies			
10.	Blackstone Keystone	Fund-of-Funds	\$969.8
Total Credit Focused Strategies			969.8
Opportunistic Equity & Fixed Income			
11.	Eaton Vance	Global Macro Strategy	213.2
12.	SEI Structured Credit Fund	High Yield Bank Loans	346.4
Total Opportunistic Equity & Fixed Income			559.6
Total Public Market Multi-Strategy			\$1,529.4

^{1/}Includes securities and cash, which the manager had available for investment.

INVESTMENT SECTION

Investment Summary - Legacy Hedge Funds

December 31, 2019 (unaudited)

Role in the SERS Fund

SERS' Legacy Hedge Fund program was historically designed to provide total returns comparable to the total fund return but with lower volatility and correlation to other asset classes. SERS is no longer actively investing in this strategy.

Program Structure

The current structure of this portfolio consists of legacy investments that will continue to decrease over time as investments are realized, liquidated, and redeemed.

Objective

SERS will continue to work with existing legacy managers as well as explore options to work with strategic partners to expedite the redemption process in a thoughtful and cost-effective way.

Status

SERS' Legacy Hedge Fund portfolios are currently in liquidation. The remaining balance has continued to decrease as SERS has successfully redeemed assets from legacy managers.

Legacy Hedge Funds

(\$ millions)

Manager	Investment Style	Market Exposure as of 12/31/19 ^{1/}
Funds-of-Hedge Funds		
1. Entrust Keystone	Fund-of-Funds	\$5.7
Total Funds-of-Hedge Funds		5.7
Absolute Return Strategies		
2. Arden	Fund-of-Funds	11.7
3. Morgan Stanley Alternative Investment Partners	Fund-of-Funds	2.5
4. PAAMCO	Fund-of-Funds	5.2
5. Robeco Investment	Fund-of-Funds	0.2
6. Legacy Hedge Funds	Fund-of-Funds	7.9
Total Absolute Return Strategies		27.5
Direct Investments		
7. Luxor Capital Partners	Direct Hedge Fund	2.0
8. Pine River Fund	Direct Hedge Fund	0.4
Total Direct Investments		2.4
Total Legacy Hedge Funds		\$35.6

^{1/}Includes securities and cash, which the manager had available for investment.

Investment Summary - Fixed Income

December 31, 2019 (unaudited)

Role in the SERS Fund

SERS' Fixed Income program is structured to:

- Generate income to pay benefits
- Provide additional liquidity to minimize capital impairment risk
- Reduce volatility of the total fund
- Protect SERS against deflation (and inflation via TIPS)
- Contribute total return to SERS when market conditions permit

Program Structure

Fixed income includes investments in publicly-traded debt obligations of sovereign, quasi-sovereign, and corporate entities. The asset class generates current income and the repayment of principal at maturity.

Shorter duration fixed income has substantially lower volatility than equity, and most fixed income investments have a low correlation with equity returns. SERS' Fixed Income program is categorized into four strategies and a separate cash allocation to improve transparency on SERS' unallocated cash amount.

Consistent with continuing cost reduction efforts, SERS has successfully lowered the overall cost of this program by increasing its exposure to index strategies and consolidating portfolios.

Objective

The objective of the Fixed Income program is to generate annualized net-of-fee returns that exceed its benchmark, the Bloomberg Barclays U.S. Aggregate Bond Index, over a three- to five-year period.

INVESTMENT SECTION

Investment Summary - Fixed Income

December 31, 2019 (unaudited)

Fixed Income

(\$ millions)

Manager	Investment Style	Market Exposure as of 12/31/19 ^{1/}
Core Plus Fixed Income		
1. Brandywine Global	Global Sovereign Credit	\$204.4
2. Pyramis Global Advisors	Commercial Mortgage-Backed Securities	340.9
3. Stone Harbor	Emerging Market Debt	168.8
Stone Harbor	Global High Yield	197.2
Total Core Plus		911.3
Core Fixed Income		
4. Mellon Capital Management	Bloomberg Barclays U.S. Aggregate	1,118.2
5. PIMCO Core	Bloomberg Barclays U.S. Aggregate ex. Treasuries	670.9
6. Taplin, Canida & Habacht (TCH)	U.S. Credit	205.0
Total Core		1,994.1
Global Treasury Inflation Protected Securities (TIPS)		
7. Brown Brothers Harriman	U.S. TIPS	231.7
8. New Century Advisors	Global TIPS	120.2
9. NISA Investment Advisors	U.S. TIPS	521.3
Total Global Treasury Inflation Protected Securities (TIPS)		873.2
Nominal U.S. Treasuries		
PIMCO U.S. Treasuries	Domestic Treasuries	596.9
Total Nominal U.S. Treasuries		596.9
Total Fixed Income		\$4,375.5

^{1/}Includes securities and cash, which the manager had available for investment.

Investment Summary - Cash

December 31, 2019 (unaudited)

Role in the SERS Fund

SERS' investment program endeavors to maintain an appropriate level of cash to pay retirement benefits and covenants during prolonged periods of market decline and state budgetary constraints.

have historically been invested in the Pennsylvania Treasury Group Investment Fund, a short-term investment fund.

Program Structure

Cash investments emphasize the use of higher credit quality debt instruments that are liquid and have short maturities and durations, or have floating rates and

Objective

The objective of Cash is to generate annualized net-of-fee returns that exceed its benchmark, the Bank of America 90-Day T-Bill Index, over a three-year period.

Cash		
(\$ millions)		
Manager	Investment Style	Market Exposure as of 12/31/19 ^{1/}
Cash		
1. PA State Treasury (STIF)	Cash	\$1,471.4
Total Cash		\$1,471.4

^{1/}Includes securities and cash, which the manager had available for investment.

INVESTMENT SECTION

Defined Contribution Plan Investment Options

December 31, 2019 (unaudited)

Defined Contribution Plan Investment Options

Participation, Assets, Performance, and Fund Expense

As of December 31, 2019

Fund Name	Participants	Fund Balance	Inception Date	Estimated Calendar Year, Net-of-Fees Returns					Max Total Investment Fund Expense ^{1/}
				1 Year	3 Year	5 Year	10 Year		
Post Retirement Date Fund	207	\$148,993.21	08-2005	15.63%	7.13%	5.22%	6.14%	0.080%	
2025 Retirement Date Fund	378	377,980.88	07-2006	18.59	8.71	6.32	7.50	0.080	
2030 Retirement Date Fund	610	995,921.76	08-2005	20.77	9.67	6.96	8.07	0.080	
2035 Retirement Date Fund	694	664,646.28	07-2006	22.84	10.56	7.55	8.58	0.080	
2040 Retirement Date Fund	745	787,809.35	08-2005	24.71	11.35	8.05	9.03	0.080	
2045 Retirement Date Fund	731	1,280,822.93	07-2006	26.03	11.83	8.36	9.36	0.080	
2050 Retirement Date Fund	841	1,055,827.15	09-2007	26.60	12.01	8.47	9.59	0.080	
2055 Retirement Date Fund	1,011	1,010,538.38	05-2010	26.66	12.02	8.47	NA	0.080	
2060 Retirement Date Fund	1,317	1,089,607.19	11-2014	26.65	11.99	8.47	NA	0.080	
2065 Retirement Date Fund	1,076	576,239.80	09-2019	NA	NA	NA	NA	0.080	
U.S. Large Company Stock Index Fund	234	387,900.96	03-2009	31.49	15.27	11.70	13.57	0.015	
U.S. Small/Mid Company Stock Index Fund	54	33,973.68	08-1998	28.18	11.15	9.03	12.92	0.025	
U.S. All Company Stock Index Fund	181	154,034.94	12-1994	30.51	14.37	11.11	NA	0.025	
Global Non-U.S. Stock Index Fund	174	232,204.04	01-2011	21.72	10.16	5.78	5.11	0.055	
U.S. Bond Index Fund	162	109,539.25	12-2017	8.66	4.00	2.99	3.68	0.025	
U.S. Short-Term Bond Index Fund	65	18,141.44	12-2017	3.99	NA	NA	NA	0.025	
U.S. Treasury Inflation Protected Security Index Fund ^{2/}	87	21,521.92	07-2007	8.36	NA	NA	NA	0.025	
Short-Term Investment Fund	21	13,840.70	10-2018	2.31	1.82	1.25	0.73	0.000	

^{1/}Maximum possible expense that can be charged.

^{2/}There was a break in the return history of the TIPS fund between 2010 and 2017, since there were no participants during that time.

The Plan's annual recordkeeping fee is \$59.50 per participant. The commonwealth is currently covering this fee.

For those in the Self-Directed Brokerage Option (SDB), the asset fee is assessed against the balance in the SDB but the actual deduction is prorated against the core investment options separately.

2019

Actuarial Section



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May 28, 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 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. The results provided herein are based upon the December 31, 2019 annual actuarial valuation for funding purposes.

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 funding 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.



Ms. Terrill J. Sanchez

May 28, 2020

The actuarial funding valuation is based on financial and participant data, which is prepared by SERS staff. We rely on that data and ensure that it is reviewed for internal and year-to-year consistency as well as general reasonableness prior to being used in the actuarial funding valuation.

The actuarial funding valuation uses assumptions regarding future rates of investment return and rates of retirement, withdrawal, death, and disability among SERS members and their beneficiaries. The current set of assumptions used in the December 31, 2019 actuarial funding valuation, with the exception of the investment return and inflation assumptions, was adopted by the State Employees' Retirement Board (the Board) based upon actual experience of SERS during the years 2011 through 2015. To ensure that the investment return assumption remains up-to-date and appropriate for every actuarial valuation, we review it annually with the SERS 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. We will continue to closely monitor this assumption and will recommend changing it if conditions warrant such change. 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.

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 fiscal years ending on or after June 30, 2014. GASB Statement No. 68, *Accounting and Financial Reporting for Pensions*, 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. GASB 67 is designed for financial reporting by pension plans and GASB 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. The Financial Section now includes new schedules in response to the reporting requirements of GASB Statement No. 67. Although two schedules that were required disclosures under Statement No. 25 were discontinued, namely the "Schedule of Funding Progress" and the "Schedule of Employer Contributions," these schedules remain of interest and, therefore, have been updated to reflect the December 31, 2019 actuarial funding valuation and are included herein.



Ms. Terrill J. Sanchez

May 28, 2020

GASB Statement No. 25, although it has been replaced by GASB Statement No. 67, established the Annual Required Contribution (ARC), which was recognized for many years as the minimum annual contribution required by GASB. How a pension plan's actual contributions compare to the ARC is likely to remain of interest despite the fact that GASB has discontinued the ARC. For SERS, the scheduled contributions from July 1, 2005 through June 30, 2015 were below the minimum amount required to meet the GASB No. 25 minimum. Originally this was a result of financing changes implemented by Act 2003-40 in December 2003. Later, this became a consequence of the contribution collars required under Act 2010-120. After June 30, 2015, because employer contributions are being made in accordance with current law, they are exceeding the GASB No. 25 minimum.

The following schedules were prepared from the December 31, 2019 actuarial funding valuation: "Schedules of Active Member Valuation Data", "Solvency Test", "Analysis of Financial Experience", "Schedule of Funding Progress", "Schedule of Contributions Under Previous Reporting Standards", and "History and Projection of Contribution Rates and Funded Ratios".

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.

Actuarial Certification

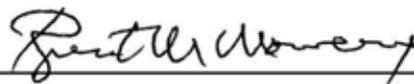
To the best of our knowledge, this report is complete and accurate and all costs and liabilities have been determined on the basis of actuarial assumptions and methods which are reasonable (taking into account the past experience of SERS and reasonable expectations) and which represent our best estimate of anticipated experience under the plan. The report, costs, liabilities, assumptions, and methods used for funding purposes are in accordance with the parameters set by Actuarial Standards of Practice.



Ms. Terrill J. Sanchez
May 28, 2020

The actuaries certifying to 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

By 
Brent M. Mowery, F.S.A.
Member American Academy of Actuaries
Enrolled Actuary No. 20-3885

By 
Kristopher E. Seets, F.S.A.
Member American Academy of Actuaries
Enrolled Actuary No. 20-8055

By 
Craig R. Graby
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Summary of Actuarial Assumptions and Methods

December 31, 2019 (unaudited)

The schedules in this Actuarial Section are reported in accordance with SERS actuarial funding valuation based on statutory requirements. For funding purposes, actuarial methods are specified by statute while actuarial assumptions are recommended by SERS actuary and approved by the SERS Board, as trustees of the State Employees' Retirement Fund. The State Employees' Retirement Code (retirement code), legislated by the General Assembly and signed into law by the Governor, establishes funding policy. The retirement code is administered by the SERS Board. The General Assembly, along with the Governor's signing, has the authority to amend the retirement code. The Financial Section, except where noted, is reported in accordance with a separate actuarial accounting valuation based on Governmental Accounting Standards Board Statement No. 67 (GASB 67).

For funding purposes, a variation of the entry-age normal actuarial cost method, which is used to determine the liabilities and costs related to SERS benefits, is based on the benefits and contributions for new members rather than for all current members from their date of entry under the entry-age actuarial cost method for financial reporting purposes under GASB 67. Ultimately, this variation for funding purposes should produce approximately the same results as the typical entry-age method over the long run. For funding purposes, a five-year smoothed market value is used as the asset valuation method compared to fair (market) value for financial reporting purposes.

SERS uses amortization periods of 10 years and 30 years with level payments over closed periods. The current amortization schedules are as follows:

- (1) Act 2010-120 established a fresh start amortization of the December 31, 2009, unfunded liability over a 30-year period beginning July 1, 2010, and ending June 30, 2040.

- (2) 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.
- (3) 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.
- (4) The extra contribution to return Act 2017-5 savings.

Actuarial methods and assumptions used for both funding purposes as well as financial reporting purposes include:

- The investment rate of return of 7.125% per year is based on an underlying rate of inflation of 2.6% per year.
- For current and future non-disabled retirees, beneficiaries, and survivors, SERS uses 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. For current and future disabled retirees, SERS uses the RP-2000 Male and Female Disabled Retiree Mortality Tables projected (using Projection Scale AA) to 2021 for males and to 2017 for females. For all pre-retirement active members, the mortality is based on actual SERS experience.

ACTUARIAL SECTION

Summary of Actuarial Assumptions and Methods

December 31, 2019 (unaudited)

- The rates for probability of retirement and the probabilities of withdrawal from active service, including death, before age and service retirements, which are presented in the **Schedules of Active Member Valuation Data**.
- The projected average salary increases of 5.6% with a range of 3.7% to 8.9%. This increase includes an underlying assumption of 2.6% for inflation. The annual rate of salary increase for promotions and longevity for members is presented in the **Schedules of Active Member Valuation Data**.
- No cost-of-living adjustments were used in the determination of actuarial valuations. SERS periodically prepares a study using actual experience in order to develop assumptions for use in its actuarial valuations. The latest study dated March 9, 2016 was completed for the period January 1, 2011 through December 31, 2015.

The most recent valuations were based on members of SERS as of December 31, 2019. All census and asset data was supplied by SERS and was subject to reasonable consistency checks. The actuarial computations were prepared by, or under the supervision of, a Member of the American Academy of Actuaries (M.A.A.A.).

Schedules of Active Member Valuation Data

December 31, 2019 (unaudited)

Table A^{1/}
Withdrawal From Active Employment Before Age and Service Retirement

Annual Rate of Active Members Separating Within the Next Year

Sample Age	Male						Female					
	Withdrawal Years of Service				Death	Disability	Withdrawal Years of Service				Death	Disability
	0	5	9	14+			0	5	9	14+		
20	24.20%	NA	NA	NA	0.04%	NA	28.40%	NA	NA	NA	0.02%	NA
25	18.50	3.00%	2.10%	NA	0.04	0.02%	22.40	3.70%	2.30%	NA	0.02	0.04%
30	16.40	3.00	2.10	1.0%	0.05	0.06	19.20	3.30	2.30	1.70%	0.02	0.09
35	15.60	2.40	1.30	1.00	0.06	0.11	15.00	3.20	2.30	1.20	0.03	0.14
40	15.00	2.40	1.30	1.00	0.09	0.17	13.40	3.20	1.20	1.00	0.04	0.19
45	14.40	2.40	0.70	1.10	0.13	0.30	13.10	2.70	1.20	1.00	0.06	0.30
50	14.40	2.60	0.70	1.10	0.24	0.42	13.10	2.70	1.50	1.00	0.09	0.45
55	14.40	1.90	0.80	0.80	0.29	0.55	13.10	1.80	1.00	1.60	0.14	0.57
60	NA	NA	NA	NA	0.35	NA	NA	NA	NA	NA	0.24	NA

Table B^{1/}
Annual Rate of Retirement

Sample Age	Full Benefits	
	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

^{1/}The assumptions presented in Table A and Table B were based on a review of SERS experience from 2011 – 2015. The rates are the probabilities that an event will occur in the year after the valuation. For instance, the male retirement rate of 25% at age 62 means that 250 of every 1,000 male employees age 62 and eligible for full benefits are expected to retire before they reach age 63.

ACTUARIAL SECTION

Schedules of Active Member Valuation Data

December 31, 2019 (unaudited)

Table C
Annual Rate of Salary Increase

Completed Years of Service	Increase	Completed Years of Service	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

Table D
Reduced Benefits

Sample Age	5 - 14 Years of Service		15 or More Years of Service	
	Male	Female	Male	Female
25	2.00%	3.70%	NA	NA
30	1.60	1.90	NA	NA
35	1.60	1.90	1.00%	1.20%
40	1.60	1.90	1.00	1.20
45	1.35	1.90	1.00	1.60
50	1.35	1.90	2.00	2.00
55	1.35	1.90	6.00	6.00

ACTUARIAL SECTION

Schedules of Active Member Valuation Data

December 31, 2019 (unaudited)

Active Members by Age and Years of Service - Male

Age Group	Years of Service							Total	Average Salary
	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30+		
< 20	36	NA	NA	NA	NA	NA	NA	36	\$30,878
20 - 24	1,281	8	NA	NA	NA	NA	NA	1,289	37,894
25 - 29	3,809	630	1	NA	NA	NA	NA	4,440	48,909
30 - 34	3,128	2,500	607	11	NA	NA	NA	6,246	57,410
35 - 39	2,104	1,854	2,295	612	9	NA	NA	6,874	63,823
40 - 44	1,614	1,286	1,808	1,705	476	7	NA	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

Active Members by Age and Years of Service - Female

Age Group	Years of Service							Total	Average Salary
	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30+		
< 20	35	NA	NA	NA	NA	NA	NA	35	\$29,336
20 - 24	973	8	NA	NA	NA	NA	NA	981	33,925
25 - 29	2,541	470	15	NA	NA	NA	NA	3,026	42,102
30 - 34	2,375	1,398	435	9	NA	NA	NA	4,217	48,282
35 - 39	1,965	1,302	1,344	449	19	NA	NA	5,079	53,218
40 - 44	1,691	1,103	1,226	1,084	323	20	NA	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

ACTUARIAL SECTION

Schedules of Active Member Valuation Data

December 31, 2019 (unaudited)

Aggregate Active Member Valuation Data

Valuation Year Ended Dec 31	Number of Employers	Number of Active Members	Covered-Employee Payroll	Annual Average Pay	% Increase/(Decrease) in Average Pay
2019	102 ^{1/}	102,850	\$6,328,566,000	\$61,532	2.6%
2018	102 ^{1/}	103,007	6,178,000,000	59,984	3.2
2017	102 ^{1/}	102,978	5,984,000,000	58,113	2.9
2016	103 ^{2/}	104,632	5,912,000,000	56,499	-0.6
2015	104 ^{3/}	105,025	5,972,000,000	56,858	3.8
2014	104 ^{3/}	104,431	5,720,000,000	54,769	2.9
2013	104	105,186	5,598,000,000	53,224	1.9
2012	105	106,048	5,539,000,000	52,230	0.1
2011	107	107,021	5,582,000,000	52,159	1.8
2010	106	109,255	5,597,000,000	51,228	0.8

^{1/}The membership includes 38 employers and the commonwealth is classified as its largest employer. The commonwealth comprises 65 agencies and when everything is evaluated separately, SERS has a total of 102 participating employers/agencies.

^{2/}The membership includes 38 employers and the commonwealth is classified as its largest employer. The commonwealth comprises 66 agencies and when everything is evaluated separately, SERS has a total of 103 participating employers/agencies.

^{3/}The membership includes 39 employers and the commonwealth is classified as its largest employer. The commonwealth comprises 66 agencies and when everything is evaluated separately, SERS has a total of 104 participating employers/agencies.

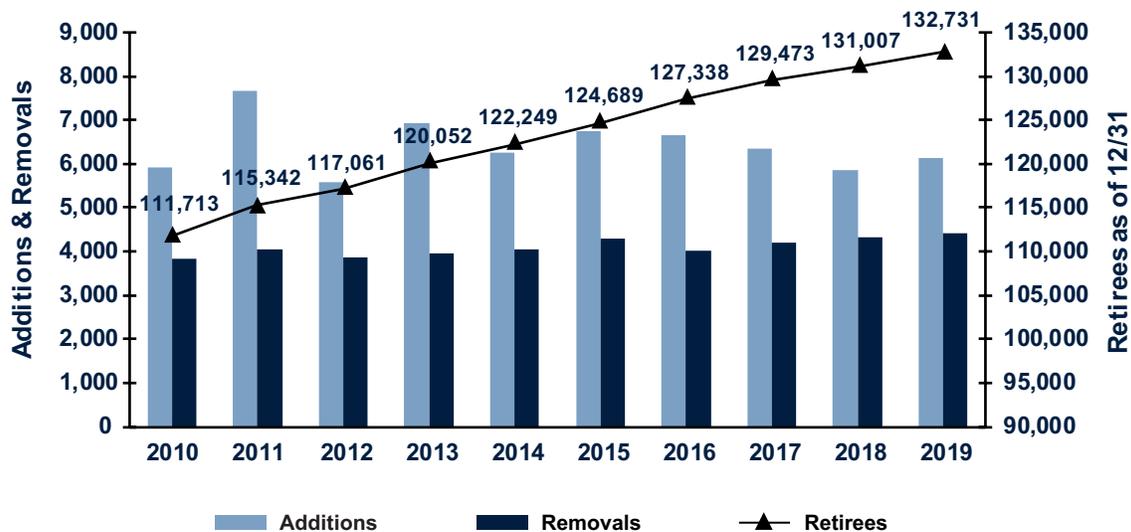
Schedule of Retirees and Beneficiaries Added to and Removed from Rolls

December 31, 2019 (unaudited)

Retirees and Beneficiaries Added to and Removed from Rolls

Year Ended	Added to Rolls		Removed from Rolls		Rolls - End of Year		Percentage Change	
	No.	Allowances	No.	Allowances	No.	Allowances ^{1/}	No.	Allowances
2019	6,132	\$176,664,651	4,408	\$72,004,815	132,731	\$3,108,945,258	1.3%	3.5%
2018	5,847	166,594,854	4,313	70,862,628	131,007	3,004,855,159	1.2	3.3
2017	6,338	178,317,205	4,203	63,576,892	129,473	2,909,267,596	1.7	4.1
2016	6,658	191,327,122	4,009	60,165,549	127,338	2,794,984,868	2.1	4.9
2015	6,743	175,810,502	4,303	63,027,188	124,689	2,664,418,763	2.0	4.4
2014	6,245	157,593,809	4,048	59,524,055	122,249	2,552,077,530	1.8	4.0
2013	6,944	178,392,487	3,953	53,186,262	120,052	2,454,388,693	2.6	5.4
2012	5,572	138,363,766	3,853	50,453,118	117,061	2,329,489,208	1.5	3.9
2011	7,669	205,521,876	4,040	50,132,667	115,342	2,241,716,566	3.3	7.4
2010	5,906	148,169,231	3,832	48,182,212	111,713	2,086,701,831	1.9	5.0

^{1/}Calculated by multiplying monthly benefit for December 31 by 12 to arrive at an annual amount.



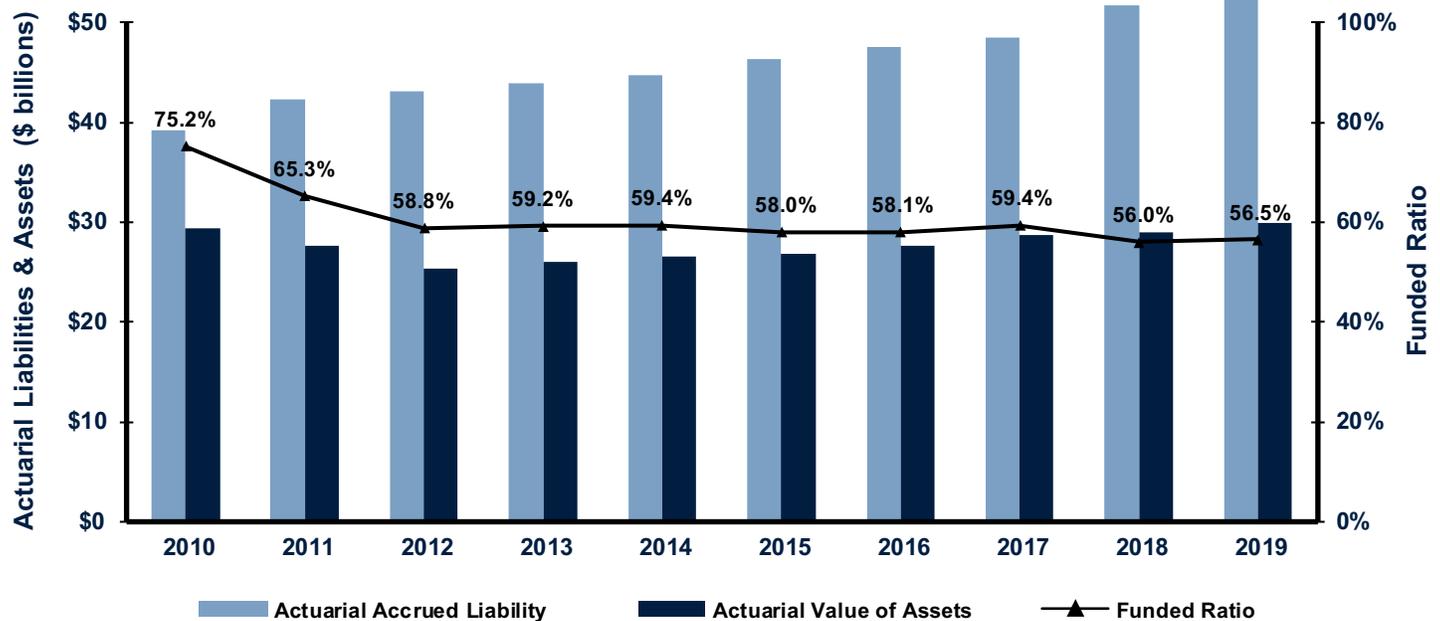
ACTUARIAL SECTION

Solvency Test

December 31, 2019 (unaudited)

Fund Solvency^{1/} (\$ thousands)

Valuation Year Ended Dec 31	Actuarial Accrued Liabilities For			Total Actuarial Accrued Liability (AAL)	Actuarial Value of Assets	Portion of Accrued Liabilities Covered by Reported Assets			Funded Ratio
	(1)	(2)	(3)			(1)	(2)	(3)	
	Active Member Contributions	Retirees and Beneficiaries	Active Members (Employer Financed Portion)						
2019	\$5,183,195	\$29,651,542	\$18,137,838	\$52,972,575	\$29,934,024	100.0%	83.5%	0.0%	56.5%
2018	5,074,760	28,558,283	18,149,162	51,782,205	\$28,989,607	100.0	83.7%	0.0	56.0
2017	4,965,765	27,798,045	15,675,593	48,439,403	28,776,939	100.0	85.7	0.0	59.4
2016	4,869,229	26,824,306	15,825,429	47,518,964	27,596,048	100.0	84.7	0.0	58.1
2015	4,816,121	25,156,125	16,356,683	46,328,929	26,877,127	100.0	87.7	0.0	58.0
2014	4,733,833	23,872,658	16,144,179	44,750,670	26,584,948	100.0	91.5	0.0	59.4
2013	4,636,219	23,046,717	16,191,644	43,874,580	25,975,185	100.0	92.6	0.0	59.2
2012	4,551,507	22,095,052	16,409,005	43,055,564	25,302,688	100.0	93.9	0.0	58.8
2011	4,406,306	21,222,075	16,653,481	42,281,862	27,618,461	100.0	100.0	11.9	65.3
2010	4,409,444	18,995,355	15,774,795	39,179,594	29,443,945	100.0	100.0	38.3	75.2



^{1/}Based on statutory funding requirements.

Analysis of Financial Experience

December 31, 2019 (unaudited)

Gains and Losses in Accrued Liabilities^{1/}
Resulting from Differences Between Assumed Experience and Actual Experience
(\$ thousands)

Type of Activity	2019	2018	2017	2016
(Loss)/gain from investment earnings ^{2/}	\$(102,778)	\$(810,749)	\$265,709	\$2,982
Changes in demographics of new entrants	191,167	0	(18,681)	6,113
Pay increases different than assumptions	(23,014)	(141,271)	(9,426)	613,858
Differences between actual and expected demographic experience	49,496	(134,609)	(144,105)	33,565
Gain/(loss) during year from financial experience	114,871	(1,086,629)	93,497	656,518
Non-recurring items				
Changes in assumptions ^{3/}	(749,930)	0	0	(1,021,315)
Loss due to collar restrictions ^{4/}	0	0	(140,438)	(375,572)
Benefit changes under Act 2017-5 ^{5/}	0	(2,373,657)	0	0
Composite loss	\$(635,059)	\$(3,460,286)	\$(46,941)	\$(740,369)

^{1/}Based on statutory funding requirements.

^{2/}Net gains and losses from returns different than the assumed rate of return that are amortized over a five-year period.

^{3/}2019 change primarily due to reduction of investment rate of return to 7.125% from 7.25%, which was approved by SERS Board at its June 2019 meeting, while 2016 change primarily due to reduction of investment rate of return to 7.25% from 7.5% and reduction of inflation to 2.6% from 2.75%, which was approved by SERS Board at its April 2017 meeting.

^{4/}Act 2010-120 capped the growth of employer contributions at 4.5% for commonwealth FY 2015-16 and each subsequent year until no longer needed.

^{5/}2018 change primarily due to decrease in normal cost to 1.25% from 4.88% due primarily to Act 2017-5 per actuarial valuation, which was approved by SERS Board at its April 2019 meeting.

ACTUARIAL SECTION

Schedule of Funding Progress

December 31, 2019 (unaudited)

Funding Progress^{1/}

(\$ thousands)

Actuarial Valuation Year Ended December 31	Actuarial Value of Assets	Actuarial Accrued Liabilities (AAL)	Ratio of Assets to AAL	Unfunded Actuarial Accrued Liability (UAAL)	Covered Payroll	UAAL as a Percentage of Covered Payroll
2019	\$29,934,024	\$52,972,575	56.5%	\$23,038,551	\$6,328,566	364.0%
2018	28,989,607	51,782,205	56.0	22,792,598	6,178,772	368.9
2017	28,776,939	48,439,403	59.4	19,662,464	5,984,361	328.6
2016	27,596,048	47,518,964	58.1	19,922,916	5,911,603	337.0
2015	26,877,127	46,328,929	58.0	19,451,802	5,971,511	325.7
2014	26,584,948	44,750,670	59.4	18,165,722	5,719,581	317.6
2013	25,975,185	43,874,580	59.2	17,899,395	5,598,420	319.7
2012	25,302,688	43,055,564	58.8	17,752,876	5,538,887	320.5
2011	27,618,461	42,281,862	65.3	14,663,401	5,582,108	262.7
2010	29,443,945	39,179,594	75.2	9,735,649	5,596,915	173.9

^{1/}Based on statutory funding requirements.

Schedule of Contributions Under Previous Reporting Standards

December 31, 2019 (unaudited)

Contributions Under Previous Reporting Standards^{1/}

Annual Required Contributions Using Governmental Accounting Standards Board Statement No. 25

(\$ thousands)

Actuarial Valuation Year Ended December 31	Annual Required Contribution (ARC)	Actual Contribution	Actual Contribution as a Percentage of ARC
2019 ^{2/}	\$2,106,138	\$2,106,138	100.0%
2018 ^{2/}	2,040,434	2,040,434	100.0
2017 ^{2/}	1,883,541	1,883,541	100.0
2016 ^{2/}	1,613,626	1,613,626	100.0
2015	1,469,116	1,359,246	92.5
2014	1,407,361	1,081,826	76.9
2013	1,314,925	790,996	60.2
2012	1,044,632	562,883	53.9
2011	913,778	391,189	42.8
2010	866,822	272,525	31.4

^{1/}The ARC is calculated as part of SERS funding valuation using Governmental Accounting Standard Board No. 25 (GASB 25) requirements. Starting in 2014, GASB 25 was superseded by Governmental Accounting Standards Board Statement No. 67 (GASB 67) for accounting purposes. GASB 67 replaces the ARC with an actuarially determined contribution (ADC). While no longer applicable to 2014 and subsequent years, this disclosure is being provided for informational purposes.

^{2/}ADC excludes multiple service transfers made to SERS. These transfers are included as contributions on the Statements of Changes in Fiduciary Net Position.

For developing the ARC, GASB 25 established a range of actuarial cost and amortization methods for the unfunded actuarial accrued liability. The scheduled contributions for the years shown above have been below the amount required to meet the GASB minimum under previous standards.

Underfunding of the ARC from 2010 through 2015 was the result of significant provisions of Act 2010-120, which capped increases in the employer contribution rate. The capped contribution rates during those years were below the respective years' ARC contribution rates.

ACTUARIAL SECTION

History and Projection of Contribution Rates and Funded Ratios

December 31, 2019 (unaudited)

Contribution Rates and Funded Ratios^{1/}

(\$ thousands)

For FY Beginning July 1 Following Valuation Year^{2/}

Valuation Year Ended Dec 31	Funding Payroll	Member Contribution Rate ^{3/}	Employer Normal Cost Rate	Unfunded Liability Rate ^{4/}	Preliminary Employer Contribution Rate ^{5/}	Final Employer Contribution Rate	Funded Ratio
2010 ^{6/}	\$5,851,704	6.25%	4.08%	14.85%	18.93%	8.00%	75.2%
2011	5,890,704	6.25	5.10	21.29	26.39	11.50	65.3
2012	5,836,402	6.25	5.01	26.21	31.22	16.00	58.8
2013	5,897,627	6.25	5.00	26.41	31.41	20.50	59.2
2014	6,021,688	6.25	4.95	26.56	31.51	25.00	59.4
2015	6,255,189	6.25	4.52	27.62	32.14	29.50	58.0
2016	6,187,427	6.25	4.91	28.31	33.22	33.22	58.1
2017 ^{7/}	6,265,071	6.25	4.88	28.02	32.90	32.90	59.4
2018	6,469,401	6.25	1.25	32.28	33.53	33.53	56.0
2019 ^{8,9/}	6,657,541	6.25	1.67	31.78	33.45	33.45	56.5
2020	6,850,610	6.25	1.67	30.59	32.26	32.26	58.3
2021 ^{10/}	7,049,277	6.25	8.91	24.42	33.33	33.33	64.6
2022	7,253,706	6.25	8.69	23.75	32.44	32.44	65.9
2023	7,464,064	6.25	8.48	22.34	30.82	30.82	68.5
2024	7,680,522	6.25	8.27	21.66	29.93	29.93	69.9
2025	7,903,257	6.25	8.07	21.01	29.08	29.08	71.3
2026	8,132,451	6.25	7.88	20.40	28.28	28.28	72.6
2027	8,368,292	6.25	7.70	19.81	27.51	27.51	74.0
2028	8,610,973	6.25	7.52	19.25	26.77	26.77	75.4
2029	8,860,691	6.25	7.36	18.70	26.06	26.06	76.8
2030	9,117,651	6.25	7.20	18.17	25.37	25.37	78.3

^{1/}Except as noted, the projection of contribution rates is based on the assumption that there are no changes in SERS statutory funding methodology, no changes in demographics or economic assumptions, no changes in benefit provisions, and no actuarial gains or losses on the actuarial value of assets that result from recognizing currently deferred gains or losses on the fair value of assets. All information on this page is based on statutory funding requirements.

^{2/}Rates and values are for the fiscal year beginning July 1 following the valuation year and do not include Benefits Completion Plan contributions.

^{3/}For Class AA and A-3 employees, as they comprise most of SERS membership.

^{4/}Act 2003-40 imposed a split amortization that recognized Cost of Living Adjustments and certain large gains over 10 years, while recognizing other gains and losses over 30 years. The effect was to suppress the unfunded liability rate for 10 years ending in 2011.

^{5/}Actuarial rate before floor and collar.

^{6/}Act 2010-120 amended the Retirement Code to collar increases to the employer contribution rate at 3.00% and 3.50% for fiscal years beginning July 1, 2011 and 2012, respectively. The employer contribution rate is collared at 4.50% for fiscal years beginning July 1, 2013, and thereafter until collar becomes unnecessary.

^{7/}Act 2010-120 amended the Retirement Code to place a permanent floor at employer normal cost after collars expire.

^{8/}Numbers are projected from 2020 – 2030 based on 2019 actuarial funding valuation.

^{9/}Act 2017-5 amended the Retirement Code to add two hybrid Defined Benefits (DB)/Defined Contributions (DC) plans and a DC-only plan effective January 1, 2019.

^{10/}Act 2017-5 amended the Retirement Code to change the funding method to Traditional Entry Age.

Summary of Plan Provisions

December 31, 2019 (unaudited)

Benefit and Contribution Provisions

SERS makes provisions for retirement, disability, and death benefits for all state employees, except for those specifically excluded under section 5301 of the State Employees' Retirement Code, and certain other eligible groups. The major provisions may be summarized as follows:

Eligible Employees

Class A

All regular state employees, employees of certain commissions and authorities, employees of state-owned educational institutions, and the Pennsylvania State University (unless such employees have joined the Public School Employees' Retirement System (PSERS), TIAA, or Alternative Retirement Program (ARP)) hired before July 1, 2001, who did not elect into the class AA membership as of December 31, 2001. This excludes judges and Magisterial District Judges who have elected class E-1 or class E-2.

Class AA

All regular state employees who are hired after June 30, 2001, and before January 1, 2011, and former class A state employees hired before July 1, 2001, who elected into class AA as of December 31, 2001. This includes employees of certain commissions and authorities, employees of state-owned educational institutions, and the Pennsylvania State University (unless such employees have joined PSERS, TIAA, or ARP), but excludes state police troopers, judges, Magisterial District Judges, and legislators with class D-4.

Class A-3

All regular state employees who enter SERS membership for the first time on or after January 1, 2011 and before December 31, 2019, and all legislators who became members on or after December 1, 2010; Capitol police and park rangers who became members after July 1, 2011; and state

police officers who became members after July 1, 2012, provided the member did not elect membership in the optional A-4 class within 45 days of becoming a member. After January 1, 2019, class A-3 is only offered to state employees in exempt positions. Exempt positions are as follows:

Class A-4

All members who would be class A-3 but elected A-4 within 45 days of becoming a member.

Class A-5

All regular state employees who enter SERS membership for the first time on or after January 1, 2019, and SERS members hired before January 1, 2019, who were given a one-time, irrevocable option to elect class A-5 as of April 1, 2019, starting July 1, 2019, while retaining prior class up to July 1, 2019, including members of the General Assembly, judges, and Magisterial District Judges.

Class A-6

All members who would be class A-5 but elected A-6 within 45 days of becoming a member, and SERS members hired before January 1, 2019, who were given a one-time, irrevocable option to elect class A-6 as of April 1, 2019, starting July 1, 2019, while retaining prior class up to July 1, 2019.

Defined Contribution-Only Plan

All members who would be class A-5 but elected the defined contribution-only plan within 45 days of becoming a member, and SERS members hired before January 1, 2019, who were given a one-time, irrevocable option to elect defined contribution-only plan as of April 1, 2019, starting July 1, 2019, while retaining prior class up to July 1, 2019. Those members choosing the defined contribution-only plan are not eligible for a benefit from the Defined Benefit Plan; but retire with their contributions, employer contributions if vested with three eligibility points, and any investment earnings on those contributions

ACTUARIAL SECTION

Summary of Plan Provisions

December 31, 2019 (unaudited)

less investment expenses and fees, however SERS members hired before January 1, 2019, who elected defined contribution-only plan as of April 1, 2019, starting July 1, 2019, still retained their eligibility for a benefit from the Defined Benefit Plan for service up to July 1, 2019.

Class D-4

Legislators coming into service after June 30, 2001, and before December 1, 2010, who elect to be SERS members and legislators who elected class D-4 before July 1, 2001.

Class E-1

Judges who elect class E-1.

Class E-2

Magisterial District Judges who elect class E-2.

Age and Service Requirements for Superannuation (Normal Retirement) in Defined Benefit Plan

(Full Formula Benefit)

Class AA/A

Age 60 with three years of service; except for members of the General Assembly, enforcement officers, correction officers, psychiatric security aids, and officers of the Delaware River Port Authority for whom the requirement is age 50 with three years of service. Members of class AA/A with 35 years of credited service are entitled to full formula benefits regardless of age. State police officers can retire on full benefits after age 50 or with 20 years of service. Capitol police and park rangers can retire on full benefits at age 50 with 20 years of Capitol police or park ranger service.

Class A-3/A-4

Age 65 for most members and age 55 for members of the General Assembly, enforcement officers,

correction officers, psychiatric security aids, Delaware River Port Authority police officers, officers of the Pennsylvania State Police, and for Capitol police officers and park rangers with 20 or more years of credited service in the classification. Members of class A-3/A-4 are eligible for full formula benefits with 35 years of credited service with a superannuation score of 92.

Class A-5/A-6

Age 67, with three years of service; or eligible for full formula benefits with 35 years of credited service with a superannuation score of 97.

Class D-4

Age 50, with three years of service.

Class E-1

Age 60, with three years of service; or 35 or more years of credited service, regardless of age.

Class E-2

Age 60, with three years of service; or 35 or more years of credited service, regardless of age.

Formula for Superannuation (Normal) Annuity in Defined Benefit Plan

The maximum single-life annuity for most members is 2% of the highest three-year average salary of the member multiplied by years and fractions of credited service multiplied by the multiplier of the class of membership. For A-5 and A-6 members the maximum single-life annuity is 2% of an average of the highest five calendar years of the member multiplied by years and fractions of credited service multiplied by the multiplier of the class of membership.

The annuity paid to a member shall not exceed the member's highest salary during any period of 12 consecutive months of creditable service.

Summary of Plan Provisions

December 31, 2019 (unaudited)

The Defined Benefit Plan multiplier for each of the major classes are as follows:

Defined Benefit Plan Multiplier for Major Classes

Class	Multiplier	
A ^{1/}	1.00	
AA	1.25	
A-3 ^{1/}	1.00	
A-4 ^{1/}	1.25	
A-5	0.625	
A-6	0.50	
D-4	1.50	
E-1	2.00	For each of the first 10 years of judicial service dropping to 1.5 for each subsequent year of judicial service.
E-2	1.50	For each year of judicial service.

^{1/}For state police with 20 – 24.99 years of service, the benefit is 50% of the highest annual salary; with 25 or more years of service, the benefit is 75% of the highest annual salary.

NOTE: There are conditions under which long-service members or members retiring at advanced ages may receive somewhat larger benefits than those described above. Further, benefit limitations exist for most members of SERS.

2019

Statistical Section

The Statistical Section of SERS' CAFR presents detailed information related to the financial statements, as well as highlights of actuarial valuations. The Statistical Section presents information on the Defined Benefit Plan only since there is limited information available for the recently launched Defined Contribution Plan. The schedules in this section are classified into the following four categories: financial trends, revenue capacity, demographic and economic information and operating information.

Financial Trends

The **Schedule of Trend Data** provides key financial, actuarial, and demographic data for 10 years ended December 31, 2019. This data includes items such as employer and member contribution rates; contributions received and benefits paid by SERS; values of assets and liabilities; and the number of annuitants, beneficiaries, and active members.

The **Schedule of Additions to Fiduciary Net Position** presents the member and employer contributions, as well as the net investment income/loss for the 10 years ended December 31, 2019. SERS investment returns have the most significant impact on fiduciary net position.

The **Schedule of Deductions from Fiduciary Net Position** presents the benefits, refunds of contributions, and administrative expenses for the 10 years ended December 31, 2019. Of these three categories, SERS benefit payments have the most significant impact on the total deductions from fiduciary net position.

The **Schedule of Benefit and Refund Deductions from Fiduciary Net Position by Type** presents the amount of benefit payments and refunds by type for the 10 years ended December 31, 2019. Most benefit

types are either normal or early, which is determined by the number of years of service and/or age at retirement.

The **Schedule of Total Changes in Fiduciary Net Position** combines the additions to and deductions from fiduciary net position from the Schedule of Additions to Fiduciary Net Position and Schedule of Deductions from Fiduciary Net Position to arrive at net increase/decrease of changes in fiduciary net position for the 10 years ended December 31, 2019.

Revenue Capacity

The **Schedule of Investment Income** presents the details of the total net investment income/loss for the 10 years ended December 31, 2019. SERS has two external sources of revenue and one own-source (internal) of revenue. Employer contributions and member contributions, which information is provided for in the Schedule of Additions to Fiduciary Net Position, are the two external sources of revenue, and investment income is SERS' own-source revenue. Since investment income/loss has the greatest impact to SERS, this schedule provides more detail on the major components of the investment income/loss, which is also disclosed in total on the Schedule of Additions to Fiduciary Net Position.

Demographic and Economic Information

The **Schedule of Active Member Statistics** provides the total number of active members, as well as the average age, average service and average salary by gender for the 10 years ended December 31, 2019.

Operating Information

The **Schedule of Retired Members by Type of Benefit** presents, for given benefit ranges, the total number of retirees, total monthly benefits, and total number of retirees by retirement type as of December 31, 2019.

STATISTICAL SECTION

Statistical Section Narrative

December 31, 2019 (unaudited)

The **Schedule of Retired Members by Option** presents, for given benefit ranges, the total number of retirees, total monthly benefits and total number of retirees by retirement option as of December 31, 2019.

The **Schedule of Average Monthly Benefit Payments** presents, in five-year increments of credited service, the average monthly benefit, average final average salary and number of retired members for the 10 years ended December 31, 2019.

The **Schedule of Average Annual Benefit Payments** presents, in five-year age increments and by gender, the average annual benefit for each major retirement type as of December 31, 2019.

The **Schedule of Employer/Agency Participation** provides the number of covered members and the corresponding percentage of participation for the five largest employers/agencies for the 10 years ended December 31, 2019, as well as a listing of additional employers/agencies participating with SERS as of December 31, 2019.

Sources: Unless otherwise noted, the information for these schedules is derived from the Financial Section and Actuarial Section of the Comprehensive Annual Financial Report for the relevant year.

Schedule of Trend Data

December 31, 2019 (unaudited)

Trend Data^{1/}

Year-End Contribution Rates

	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
Employer ^{2/3/4/}	33.59%	32.93%	33.24%	29.51% ^{7/}	25.01% ^{7/}	20.53% ^{7/}	16.05% ^{7/}	11.59% ^{7/}	8.01% ^{7/}	5.01% ^{8/}
Member	4.95% ^{10/}	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%
Contributions										
Employer ^{2/}	\$2,114,882	\$2,048,594	\$1,897,404	\$1,622,123	\$1,360,431	\$1,084,104	\$794,911	\$565,621	\$391,749	\$273,083
Member	\$404,769	\$393,925	\$383,359	\$374,570	\$371,624	\$365,923	\$351,968	\$347,937	\$350,852	\$349,049
Average Annual Compensation	\$61,532	\$59,984	\$58,113	\$56,499	\$56,858	\$54,769	\$53,224	\$52,230	\$52,159	\$51,228
Fiduciary Net Position (FNP)	\$31,096,319	\$26,956,990	\$29,405,042 ^{11/}	\$26,387,889	\$26,054,890	\$27,337,778	\$27,394,156	\$25,389,335	\$24,377,179	\$25,886,102
Total Pension Liability (TPL) ^{5/}	\$49,274,314	\$47,768,011	\$46,696,751	\$45,648,214	\$44,238,721	\$42,195,186	\$41,057,541	NA	NA	NA
FNP as % of TPL ^{5/}	63.1%	56.4%	63.0%	57.8%	58.9%	64.8%	66.7%	NA	NA	NA
Net Pension Liability ^{5/}	\$18,177,995	\$20,831,021	\$17,291,709	\$19,260,325	\$18,183,831	\$14,857,408	\$13,663,385	NA	NA	NA
Actuarial Value of Assets ^{4/}	\$29,934,024	\$28,989,607	\$28,776,939	\$27,596,048	\$26,877,127	\$26,584,948	\$25,975,185	\$25,302,688	\$27,618,461	\$29,443,945
Actuarial Accrued Liability ^{4/}	\$52,972,575	\$51,782,205	\$48,439,403	\$47,518,964	\$46,328,929	\$44,750,670	\$43,874,580	\$43,055,564	\$42,281,862	\$39,179,594
Funded Ratio ^{4/}	56.5%	56.0%	59.4%	58.1%	58.0%	59.4%	59.2%	58.8%	65.3%	75.2%
Total Benefits and Refunds	\$3,512,671	\$3,394,636	\$3,303,543	\$3,227,548	\$3,080,861	\$2,946,465	\$2,844,285	\$2,674,133	\$2,705,263	\$2,449,253
Average Pension ^{6/}	\$29,440	\$28,880	\$28,352	\$27,722	\$27,042	\$26,426	\$25,839	\$25,083	\$24,448	\$23,491
Annuitants and Beneficiaries	132,731	131,007	129,473	127,338	124,689	122,249	120,052	117,061	115,342	111,713
Active Members	102,850	103,007	102,978	104,632	105,025	104,431	105,186	106,048	107,021	109,255

^{1/}All dollar amounts are in thousands, except Average Annual Compensation and Average Pension.

^{2/}Includes Benefits Completion Plan contribution.

^{3/}Employer rate represents total contributions as a percent of covered-employee payroll at December 31.

^{4/}Based on actuarial valuation for funding purposes as required by statute.

^{5/}Based on actuarial valuation for financial purposes as required by Governmental Accounting Standards Board Statement No. 67 (GASB 67). Information for 10 years will be displayed in the future to coincide with financial reporting requirements under GASB 67.

^{6/}Represents average annual pension only for members who have reached superannuation through age or service credits.

^{7/}Act 2010-120 set collars on the increase of the employer contribution rate at 3% effective July 1, 2011, 3.5% for July 1, 2012, and 4.5% every year thereafter until no longer needed.

^{8/}Act 2010-46 set the employer contribution rate at 5% effective July 1, 2010.

^{9/}Act 2007-8 established a permanent minimum employer contribution rate floor of 4%.

^{10/}Act 2017-5 established a two new side-by-side hybrid defined benefit/defined contribution benefit option and a new DC-only option to all state employees, excluding most hazardous duty employees. This reduced the member contribution rate.

^{11/}In 2017, fiduciary net position excluded OPEB adjustment by Governmental Accounting Standard Board Statement No 75 (GASB 75).

Source: Pennsylvania State Employees' Retirement System

STATISTICAL SECTION

Schedule of Additions to Fiduciary Net Position

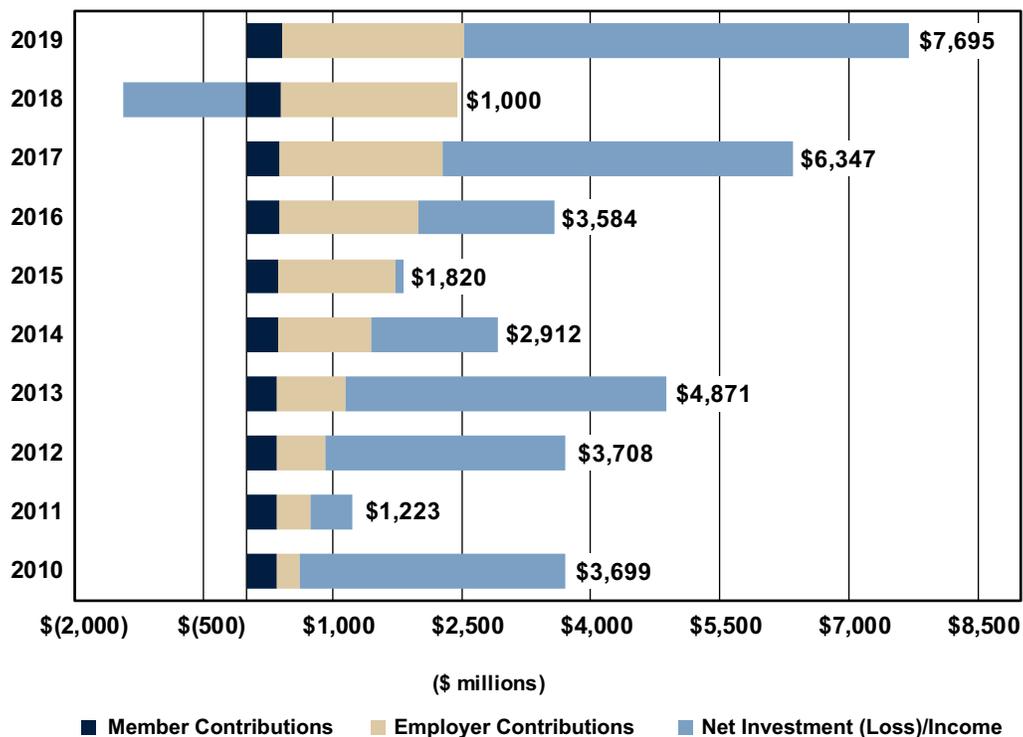
December 31, 2019 (unaudited)

Additions to Fiduciary Net Position

(\$ thousands)

Year Ended	Member Contributions	Employer Contributions		Net Investment Income/(Loss)	Total
		Dollar Amount	% of Covered-Employee Payroll ^{1/}		
2019	\$404,769	\$2,114,882	33.4%	\$5,175,624	\$7,695,275
2018	393,925	2,048,594	33.2	(1,442,291)	1,000,228
2017	383,359	1,897,404	31.7	4,066,055	6,346,818
2016	374,570	1,622,123	27.4	1,586,853	3,583,546
2015	371,624	1,360,431	22.8	87,990	1,820,045
2014	365,923	1,084,104	19.0	1,462,051	2,912,078
2013	351,968	794,911	14.2	3,724,038	4,870,917
2012	347,937	565,621	10.2	2,794,940	3,708,498
2011	350,852	391,749	7.0	480,445	1,223,046
2010	349,049	273,083	4.9	3,076,410	3,698,542

^{1/}Calculated by dividing employer contributions by total annualized compensation (covered-employee payroll) provided by actuary.



Source: Pennsylvania State Employees' Retirement System

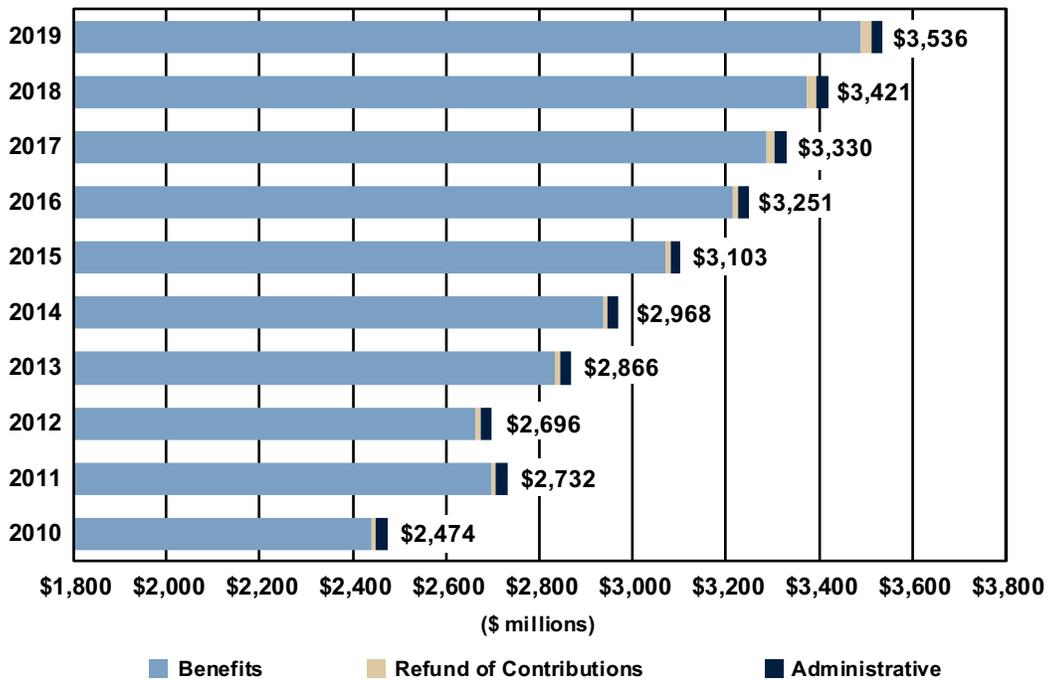
Schedule of Deductions from Fiduciary Net Position

December 31, 2019 (unaudited)

Deductions from Fiduciary Net Position

(\$ thousands)

Year Ended	Benefits	Refund of Contributions	Administrative Expenses	Total
2019	\$3,490,311	\$22,360	\$23,275	\$3,535,946
2018	3,375,394	19,242	25,950	3,420,586
2017	3,287,923	15,620	26,122	3,329,665
2016	3,214,440	13,108	22,999	3,250,547
2015	3,069,328	11,533	22,072	3,102,933
2014	2,936,591	9,874	21,991	2,968,456
2013	2,833,676	10,609	21,811	2,866,096
2012	2,664,242	9,891	22,209	2,696,342
2011	2,695,732	9,531	26,706	2,731,969
2010	2,440,246	9,007	25,136	2,474,389



Source: Pennsylvania State Employees' Retirement System

STATISTICAL SECTION

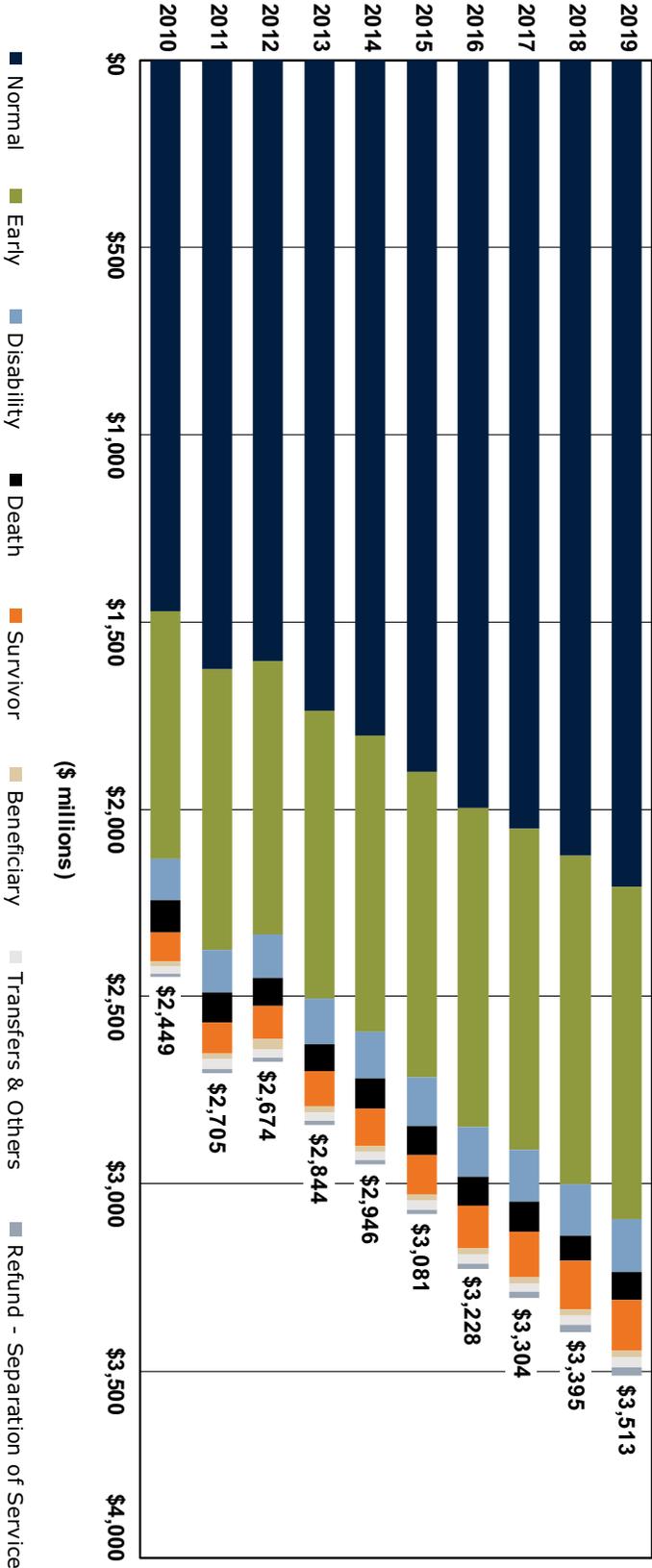
Schedule of Benefit and Refund Deductions from Fiduciary Net Position by Type

December 31, 2019 (unaudited)

Benefit and Refund Deductions from Fiduciary Net Position by Type

(\$ thousands)

Year Ended	Retirement										Refunds			Total Refunds
	Normal	Early	Disability	Death	Survivor	Beneficiary	Transfers & Other	Total Benefit Deductions	Separation of Service	Death	Refunds			
2019	\$2,207,145	\$888,899	\$139,607	\$74,257	\$137,479	\$16,855	\$26,069	\$3,490,311	\$21,932	\$428	\$22,360			
2018	2,122,512	877,579	137,616	66,408	129,533	15,581	26,165	3,375,394	19,009	233	19,242			
2017	2,051,059	859,554	135,707	80,322	121,511	16,510	23,260	3,287,923	15,372	248	15,620			
2016	1,997,704	851,302	132,833	76,455	114,465	15,976	25,705	3,214,440	12,861	247	13,108			
2015	1,900,468	816,595	129,810	75,845	106,748	16,066	23,796	3,069,328	11,302	231	11,533			
2014	1,803,669	789,723	126,457	78,580	100,527	15,510	22,125	2,936,591	9,723	151	9,874			
2013	1,737,107	769,385	121,640	71,216	93,919	17,271	23,138	2,833,676	10,318	291	10,609			
2012	1,604,985	728,719	116,914	75,254	88,055	26,497	23,818	2,664,242	9,673	218	9,891			
2011	1,626,233	749,180	112,575	82,123	82,467	15,093	28,061	2,695,732	9,271	260	9,531			
2010	1,470,101	663,004	109,506	84,878	77,384	14,039	21,334	2,440,246	8,693	314	9,007			



Source: Pennsylvania State Employees' Retirement System

Schedule of Total Changes in Fiduciary Net Position

December 31, 2019 (unaudited)

Total Changes in Fiduciary Net Position

(\$ thousands)

Year Ended	Additions to Fiduciary Net Position			Deductions from Fiduciary Net Position					Net (Decrease)/ Increase
	Member Contributions	Employer Contributions	Net Investment Income/ (Loss)	Total Additions	Benefits	Refund of Contributions	Administrative Expenses	Total Deductions	
2019	\$404,769	\$2,114,882	\$5,175,624	\$7,695,275	\$3,490,311	\$22,360	\$23,275	\$3,535,946	\$4,159,329
2018	393,925	2,048,594	(1,442,291)	1,000,228	3,375,394	19,242	25,950	3,420,586	(2,420,358)
2017	383,359	1,897,404	4,066,055	6,346,818	3,287,923	15,620	26,122	3,329,665	3,017,153
2016	374,570	1,622,123	1,586,853	3,583,546	3,214,440	13,108	22,999	3,250,547	332,999
2015	371,624	1,360,431	87,990	1,820,045	3,069,328	11,533	22,072	3,102,933	(1,282,888)
2014	365,923	1,084,104	1,462,051	2,912,078	2,936,591	9,874	21,991	2,968,456	(56,378)
2013	351,968	794,911	3,724,038	4,870,917	2,833,676	10,609	21,811	2,866,096	2,004,821
2012	347,937	565,621	2,794,940	3,708,498	2,664,242	9,891	22,209	2,696,342	1,012,156
2011	350,852	391,749	480,445	1,223,046	2,695,732	9,531	26,706	2,731,969	(1,508,923)
2010	349,049	273,083	3,076,410	3,698,542	2,440,246	9,007	25,136	2,474,389	1,224,153

Source: Pennsylvania State Employees' Retirement System

STATISTICAL SECTION

Schedule of Investment Income

December 31, 2019 (unaudited)

	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
Investment Income										
(\$ thousands)										
Investment income/(loss)										
From investing activities										
Net appreciation/(depreciation) in fair value of investments ^{1/}	\$4,901,079	\$(1,733,999)	\$3,710,739	\$1,233,501	\$(216,817)	\$1,155,301	\$3,476,349	\$2,268,730	\$614,117	\$2,211,065
Commingled funds appreciation/(depreciation) and income ^{2/}	NA	NA	NA	NA	NA	NA	NA	NA	275,103	(267,177)
Interest	162,152	142,918	126,728	126,219	130,616	142,434	120,815	144,431	165,082	146,995
Dividends	182,853	203,533	260,013	273,733	223,927	246,528	204,214	190,733	78,823	61,964
Real estate income	101,283	74,115	95,533	89,327	108,844	93,167	99,314	97,641	82,707	73,355
Miscellaneous income	5,269	889	3,713	27,381	3,426	1,799	668	4,583	2,316	6,471
Total investing activities income/(loss)	5,352,636	(1,312,544)	4,196,726	1,750,161	249,996	1,639,229	3,901,360	2,981,221	675,868	3,309,997
Investment expenses	(179,344)	(133,146)	(135,079)	(167,712)	(166,610)	(186,527)	(181,042)	(189,722)	(197,505)	(235,826)
Net income/(loss) from investing activities	5,173,292	(1,445,690)	4,061,647	1,582,449	83,386	1,452,702	3,720,318	2,791,499	478,363	3,074,171
From securities lending activities										
Securities lending income	2,587	3,771	4,883	4,893	5,105	9,917	4,326	3,953	2,376	2,511
Securities lending expenses	(255)	(372)	(475)	(489)	(501)	(568)	(606)	(512)	(294)	(272)
Net income/(loss) from securities lending activities	2,332	3,399	4,408	4,404	4,604	9,349	3,720	3,441	2,082	2,239
Net investment income/(loss)	\$5,175,624	\$(1,442,291)	\$4,066,055	\$1,586,853	\$87,990	\$1,462,051	\$3,724,038	\$2,794,940	\$480,445	\$3,076,410

^{1/}In 2014, SERS began to report commingled funds as part of net appreciation/(depreciation) in fair value of investments. Certain 2013 figures were restated to conform to 2014 reporting.

Source: Pennsylvania State Employees' Retirement System

Schedule of Active Member Statistics

December 31, 2019 (unaudited)

Active Member Statistics

Year Ended	Male			Female			Total Number of Active Members
	Average Age	Average Service	Average Salary	Average Age	Average Service	Average Salary	
2019	46.00	11.51	\$66,220	46.61	10.71	\$55,439	102,850
2018	46.06	11.65	64,716	46.62	10.83	53,794	103,007
2017	46.23	11.79	62,739	46.61	10.97	52,049	102,978
2016	46.15	11.73	60,965	46.51	10.95	50,629	104,632
2015	46.33	11.94	61,639	46.57	11.11	50,525	105,205
2014	46.55	12.12	59,228	46.77	11.44	48,825	104,431
2013	46.63	12.19	57,416	46.92	11.64	47,583	105,186
2012	46.64	12.23	56,118	46.90	11.79	46,981	106,048
2011	46.55	12.17	56,008	46.70	11.70	46,992	107,021
2010	46.58	12.36	54,983	46.71	11.91	46,206	109,255

Source: Pennsylvania State Employees' Retirement System

STATISTICAL SECTION

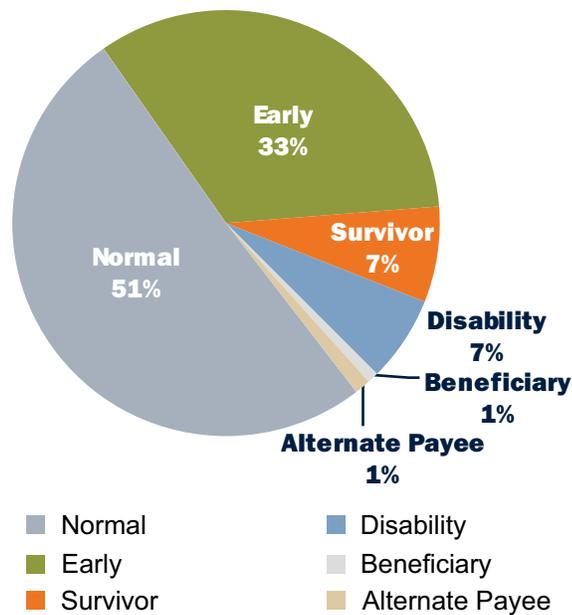
Schedule of Retired Members by Type of Benefit

December 31, 2019 (unaudited)

Retired Members by Type of Benefit

Amount of Monthly Benefits	Total Monthly Benefits ^{4/}	Total Number of Retirees	Type of Benefit					
			Normal	Disability	Early	Beneficiary	Survivor	Alternate Payee
≤ \$500	\$6,468,899	26,915	5,646	452	16,953	442	2,879	543
> 500 to 1,000	15,758,837	21,120	9,595	3,341	4,888	310	2,492	494
> 1,000 to 1,500	21,942,200	17,720	9,310	2,203	4,091	138	1,653	325
> 1,500 to 2,000	25,406,851	14,563	7,873	1,169	4,366	91	926	138
> 2,000 to 2,500	28,006,065	12,494	7,215	666	3,871	52	642	48
> 2,500 to 3,000	27,460,935	10,015	6,260	375	2,964	33	362	21
> 3,000 to 3,500	27,513,079	8,489	5,647	207	2,352	18	253	12
> 3,500 to 4,000	22,735,199	6,090	4,359	108	1,474	13	133	3
> 4,000 to 4,500	18,906,493	4,469	3,377	55	927	15	94	1
> 4,500 to 5,000	14,327,487	3,027	2,354	27	580	6	57	3
> 5,000 to 5,500	11,954,121	2,281	1,593	13	601	6	67	1
> 5,500 to 6,000	9,748,335	1,699	1,163	8	495	3	30	NA
> 6,000	28,850,271	3,849	2,916	4	869	3	56	1
Totals	\$259,078,771	132,731	67,308	8,628	44,431	1,130	9,644	1,590

^{4/}Does not include supplemental payments and transfers.



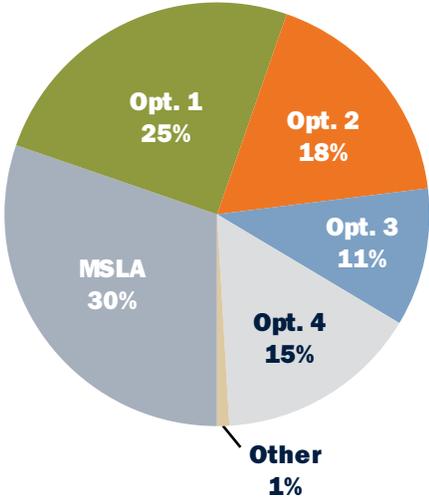
Source: Pennsylvania State Employees' Retirement System

Schedule of Retired Members by Option

December 31, 2019 (unaudited)

Retired Members by Option

Amount of Monthly Benefits	Total Monthly Benefits	Total Number of Retirees	Option Selected					
			MSLA	Opt. 1	Opt. 2	Opt. 3	Opt. 4	Other
≤ \$500	\$6,468,899	26,915	6,204	10,879	5,688	1,502	2,173	469
> 500 to 1,000	15,758,837	21,120	7,310	4,926	4,229	2,046	2,270	339
> 1,000 to 1,500	21,942,200	17,720	5,550	3,992	3,581	1,891	2,555	151
> 1,500 to 2,000	25,406,851	14,563	4,528	3,270	2,556	1,737	2,368	104
> 2,000 to 2,500	28,006,065	12,494	3,713	2,673	2,129	1,540	2,383	56
> 2,500 to 3,000	27,460,935	10,015	3,097	2,069	1,541	1,269	2,001	38
> 3,000 to 3,500	27,513,079	8,489	2,571	1,808	1,227	1,095	1,769	19
> 3,500 to 4,000	22,735,199	6,090	2,087	1,182	759	848	1,200	14
> 4,000 to 4,500	18,906,493	4,469	1,502	799	570	588	994	16
> 4,500 to 5,000	14,327,487	3,027	973	501	376	427	744	6
> 5,000 to 5,500	11,954,121	2,281	736	347	267	272	653	6
> 5,500 to 6,000	9,748,335	1,699	558	264	182	222	470	3
> 6,000	28,850,271	3,849	1,373	512	423	554	984	3
Totals	\$259,078,771	132,731	40,202	33,222	23,528	13,991	20,564	1,224



- MSLA - Maximum Single-Life Annuity
- Opt. 1 - Beneficiary receiving remainder of present value when member dies
- Opt. 2 - Survivor receiving 100% of the member's annuity when member dies
- Opt. 3 - Survivor receiving 50% of the member's annuity when member dies
- Opt. 4 - Member designs a different plan approved by SERS not covered under the above options
- Other - Death benefit or domestic relations order

Source: Pennsylvania State Employees' Retirement System

STATISTICAL SECTION

Schedule of Average Monthly Benefit Payments

December 31, 2019 (unaudited)

Average Monthly Benefit Payments^{1/}

Retirement Effective Dates	Years of Credited Service						
	< 5	5-9	10-14	15-19	20-24	25-29	30+
Period 1/1/2019 to 12/31/2019							
Average monthly benefit	\$258	\$570	\$1,061	\$1,606	\$2,422	\$3,778	\$4,654
Average final average salary	\$44,084	\$48,697	\$55,118	\$59,822	\$68,438	\$82,120	\$80,137
Number of retired members	76	512	839	574	861	940	1,178
Period 1/1/2018 to 12/31/2018							
Average monthly benefit	\$284	\$531	\$1,018	\$1,556	\$2,467	\$3,937	\$4,466
Average final average salary	\$39,834	\$46,591	\$54,260	\$58,668	\$68,305	\$84,510	\$78,312
Number of retired members	51	586	808	578	799	1,008	1,093
Period 1/1/2017 to 12/31/2017							
Average monthly benefit	\$226	\$488	\$928	\$1,490	\$2,352	\$3,853	\$4,495
Average final average salary	\$36,612	\$43,755	\$51,691	\$56,721	\$65,980	\$83,170	\$78,194
Number of retired members	46	681	820	526	788	1,033	1,166
Period 1/1/2016 to 12/31/2016							
Average monthly benefit	\$331	\$472	\$987	\$1,574	\$2,259	\$4,116	\$4,349
Average final average salary	\$48,086	\$45,428	\$51,515	\$57,976	\$63,844	\$85,896	\$75,240
Number of retired members	53	777	786	528	845	1,209	1,332
Period 1/1/2015 to 12/31/2015							
Average monthly benefit	\$308	\$433	\$896	\$1,369	\$2,279	\$3,396	\$4,214
Average final average salary	\$43,955	\$44,272	\$48,934	\$53,496	\$64,173	\$75,168	\$72,142
Number of retired members	71	924	744	515	772	1,036	1,454
Period 1/1/2014 to 12/31/2014							
Average monthly benefit	\$300	\$453	\$892	\$1,462	\$2,177	\$3,256	\$4,061
Average final average salary	\$43,879	\$43,513	\$48,310	\$55,258	\$61,462	\$72,587	\$70,590
Number of retired members	91	963	814	473	912	1,018	1,344
Period 1/1/2013 to 12/31/2013							
Average monthly benefit	\$262	\$399	\$845	\$1,466	\$2,178	\$3,408	\$4,036
Average final average salary	\$40,035	\$42,368	\$47,413	\$55,071	\$61,526	\$74,649	\$69,812
Number of retired members	68	947	779	496	814	1,049	1,451
Period 1/1/2012 to 12/31/2012							
Average monthly benefit	\$261	\$406	\$823	\$1,495	\$2,101	\$3,464	\$4,073
Average final average salary	\$38,197	\$42,106	\$46,477	\$54,120	\$58,807	\$74,455	\$70,238
Number of retired members	94	899	724	535	680	908	1,184
Period 1/1/2011 to 12/31/2011							
Average monthly benefit	\$263	\$445	\$843	\$1,430	\$2,095	\$2,994	\$3,829
Average final average salary	\$36,895	\$44,808	\$46,588	\$52,687	\$58,928	\$67,793	\$66,989
Number of retired members	103	851	716	769	856	1,134	2,276
Period 1/1/2010 to 12/31/2010							
Average monthly benefit	\$254	\$398	\$788	\$1,332	\$2,109	\$2,938	\$3,818
Average final average salary	\$39,114	\$41,128	\$44,562	\$50,607	\$57,784	\$66,053	\$65,579
Number of retired members	75	755	505	646	712	846	1,662

^{1/}Includes normal retirement, early retirement, and disability benefits for new retirees in the years listed.

Source: Pennsylvania State Employees' Retirement System

Schedule of Average Annual Benefit Payments

December 31, 2019 (unaudited)

Average Annual Benefit Payments

Age	Normal		Early		Disability		Beneficiary and Survivor	
	Male	Female	Male	Female	Male	Female	Male	Female
Under 25	NA	NA	NA	NA	NA	NA	\$9,949	\$6,398
25-29	NA	NA	\$545	\$626	NA	\$15,371	7,621	8,449
30-34	NA	NA	1,411	1,057	\$15,524	12,428	10,881	8,972
35-39	NA	NA	2,149	1,423	15,753	14,494	7,618	9,595
40-44	NA	NA	2,910	2,122	17,401	14,784	10,246	8,744
45-49	NA	NA	19,137	3,980	19,529	15,801	11,842	11,442
50-54	\$49,174	\$36,165	35,188	8,808	20,400	17,123	8,233	13,288
55-59	45,820	43,451	26,687	15,076	19,831	17,417	9,190	13,797
60-64	38,387	34,711	24,550	17,981	18,795	16,893	9,885	14,303
65-69	32,252	29,732	22,984	17,479	16,963	15,672	13,468	15,826
70-74	31,121	26,092	23,496	16,276	15,149	14,093	13,580	16,385
75-79	31,061	22,636	20,346	13,456	11,599	10,913	10,953	16,230
80-84	28,531	18,289	15,757	10,516	9,176	9,065	10,144	14,360
85-89	24,447	13,991	15,760	9,265	9,730	7,866	9,621	12,317
90 and over	20,307	11,163	14,326	8,089	9,942	7,336	9,756	10,098
Total Average	\$32,258	\$25,564	\$22,608	\$13,996	\$17,040	\$15,007	\$11,132	\$14,183

	Normal	Early	Disability	Beneficiary and Survivor
Average Pension	\$29,440	\$18,428	\$15,980	\$13,816
Average Age	72.5	65.5	64.5	74.7

Source: Pennsylvania State Employees' Retirement System

STATISTICAL SECTION

Schedule of Employer/Agency Participation

December 31, 2019 (unaudited)

Schedule of Employer/Agency Participation - 5 Largest

- Number of active members

% - Percentage of total active members

Year Ended	Department of Human Services		Department of Corrections		Department of Transportation		Pennsylvania State University		Pennsylvania State Police		Active Members for 5 Largest Employers/Agencies	
	#	%	#	%	#	%	#	%	#	%	#	%
2019 ^{1/}	16,404	15.95	15,359	14.93	12,144	11.81	6,868	6.68	6,432	6.25	57,207	55.62
2018 ^{1/}	16,396	15.92	15,610	15.15	12,088	11.74	6,772	6.57	6,353	6.17	57,219	55.55
2017	16,624	16.14	15,435	14.99	12,221	11.87	6,308	6.13	6,255	6.07	56,843	55.20
2016	17,205	16.44	15,752	15.05	12,312	11.77	6,367	6.09	6,219	5.94	57,855	55.29
2015	17,085	16.27	15,362	14.63	12,434	11.84	6,111	5.82	6,459	6.15	57,451	54.70
2014	16,870	16.15	14,916	14.28	12,325	11.80	6,123	5.86	6,323	6.05	56,557	54.16
2013	16,668	15.85	15,529	14.76	12,656	12.03	6,210	5.90	6,084	5.78	57,147	54.33
2012	16,764	15.81	15,682	14.79	12,729	12.00	6,368	6.00	6,012	5.67	57,555	54.27
2011	17,087	15.97	15,764	14.73	12,826	11.98	6,532	6.10	6,033	5.64	58,242	54.42
2010	18,007	16.48	16,133	14.77	12,427	11.37	6,653	6.09	6,084	5.57	59,304	54.28

Numbers may not add due to rounding.

^{1/}The membership includes 38 employers and the commonwealth is classified as its largest employer. The commonwealth is comprised of 65 agencies and when everything is evaluated separately, SERS has a total of 102 participating employers/agencies.

Source: Pennsylvania State Employees' Retirement System

Schedule of Employer/Agency Participation

As of December 31, 2019 (unaudited)

Remaining Employers/Agencies^{1/}

Administrative Office of Pennsylvania Courts
Bloomsburg University Community Activities
Board of Probation and Parole
Bucks County Community College
Bucks County Health Department
California University Student Association, Inc.
Capitol Preservation Committee
Center for Rural Pennsylvania
Central Susquehanna Intermediate Unit
Chester County Health Department
Clarion Students' Association
Community College of Allegheny County
Community College of Philadelphia
Delaware County Community College
Delaware River Joint Toll Bridge Commission
Delaware River Port Authority
Delaware Valley Regional Planning Commission
Department of Aging
Department of Agriculture
Department of Banking and Securities
Department of Community and Economic Development
Department of Conservation and Natural Resources
Department of Drug and Alcohol Programs
Department of Education
Department of Environmental Protection
Department of General Services
Department of Health
Department of Labor and Industry
Department of Military and Veterans Affairs
Department of Revenue
Department of State
Department of the Auditor General
East Stroudsburg University Student Activity Association, Inc.
Edinboro University Services Inc.
Environmental Hearing Board
Erie County Department of Health
Executive Offices
Fish and Boat Commission
Game Commission
Harrisburg Area Community College
Historical and Museum Commission
House Democratic Appropriations Committee
House of Representatives
House Republican Appropriations Committee
Independent Fiscal Office
Independent Regulatory Review Commission
Indiana University Student Co-op Association
Insurance Department
Joint Legislative Conservation Committee
Joint State Government Commission
Kutztown University Student Services, Inc.
Lancaster-Lebanon Intermediate Unit
Legislative Budget and Finance Committee
Legislative Data Processing Center
Legislative Reference Bureau
Lehigh Carbon Community College
Liquor Control Board
Local Government Commission
Luzerne County Community College
Mansfield College Community Services, Inc.
Milk Marketing Board
Millersville University Student Services, Inc.
Montgomery County Community College
Northampton Community College
Office of Attorney General
Office of Liquidations and Rehabilitations
Office of the Governor
Office of the Lieutenant Governor
Pennsylvania College of Technology
Pennsylvania Convention Center
Pennsylvania Emergency Management Agency
Pennsylvania Gaming Control Board
Pennsylvania Health Care Cost Containment Council
Pennsylvania Higher Education Assistance Agency
Pennsylvania Highlands Community College
Pennsylvania Housing Finance Agency
Pennsylvania Infrastructure Investment Authority
Pennsylvania Municipal Retirement System
Pennsylvania Port Authority
Pennsylvania State Employees' Retirement System
Pennsylvania State Senate
Pennsylvania Turnpike Commission
Port Authority Transit Corporation
Public School Employees' Retirement System
Public Utility Commission
Reading Area Community College
Shippensburg University Student Services, Inc.
Slippery Rock Student Government Association, Inc.
State Civil Service Commission
State Ethics Commission
State Public School Building Authority
State System of Higher Education
Susquehanna River Basin Commission
Thaddeus Stevens College of Technology
Treasury Department
West Chester University Student Services, Inc.
Westmoreland County Community College

^{1/}The membership includes 38 employers and the commonwealth is classified as its largest employer. The commonwealth is comprised of 65 agencies and when everything is evaluated separately, SERS has a total of 102 participating employers/agencies.

State Employees' Retirement System

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