In 1956, an ambitious and enterprising group of state employees discussed the possibility of starting a retirement plan and asked their colleagues to contribute 50 cents if they were interested in participating. The proceeds of that fundraising effort were used to hire an actuarial firm to draft the legislation that culminated in the creation of MOSERS. In September 1957, MOSERS was established under an act of the 69th General Assembly (HB 188).
Missouri State Employees' Retirement System
A Component Unit of the State of Missouri

Comprehensive Annual Financial Report
Fiscal Year Ended June 30, 2017

John Watson
Executive Director

Lori Woratzeck
Chief Finance Officer
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MISSION

MOSERS exists to advance the financial security of its members.

VISION

We endeavor to:

Exceed customer expectations

Educate stakeholders

Ensure sound investment practices

Encourage responsible funding of the plan through a commitment to Excellence. Always.

VALUES

Quality • Respect • Integrity

Openness • Accountability
MOSERS’ first Handbook of Information, dated July 1, 1958 states “A member in the state service may retire at his option with the consent of his employer if he has attained the age of 60 years and having had at least 20 years of creditable service.” The maximum annual salary on which a member’s benefits were calculated was initially $7,500. In October 1967, the maximum annual salary increased to $15,000. During Fiscal Year 1967, MOSERS paid $1.47 million in benefits to such members.
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Professional Awards

Certificate of Achievement for Excellence in Financial Reporting

MOSERS’ Comprehensive Annual Financial Report for the fiscal year ended June 30, 2016, was awarded the Certificate of Achievement for Excellence in Financial Reporting by the Government Finance Officers Association of the United States and Canada (GFOA). This was the 28th consecutive year that MOSERS has received this prestigious award. The Certificate of Achievement is the highest form of recognition for excellence in state and local government financial reporting. To be awarded a Certificate of Achievement, a government must publish an easily readable and efficiently organized comprehensive annual financial report (CAFR). The CAFR must satisfy generally accepted accounting principles, applicable legal requirements, and GFOA reporting standards.

Public Pension Standards Award

MOSERS received the Public Pension Standards Award from the Public Pension Coordinating Council (PPCC) in 2016, in recognition of meeting professional standards for plan design and administration as set forth in the Public Pension Standards. This award is presented by the PPCC, a confederation of the National Association of State Retirement Administrators (NASRA), the National Conference on Public Employee Retirement Systems (NCPERS), and the National Council on Teacher Retirement (NCTR).
October 16, 2017

The Board of Trustees
Missouri State Employees' Retirement System
907 Wildwood Drive
Jefferson City, MO 65109

Dear Board Members:

It is my pleasure to submit the 2017 Comprehensive Annual Financial Report (CAFR) of the Missouri State Employees' Retirement System (MOSERS). This CAFR is a presentation of the financial results for MOSERS within the specific time frame of the last fiscal year. These financial results provide useful measurements for the evaluation of programs and represent a chronicle of plan status from one year to another. At MOSERS, a strong emphasis is placed on transparency. We believe the production of this report assists in that overall mission.

Report Contents and Structure

This CAFR is designed to satisfy the reporting requirements of state law as stipulated in Sections 104.480, 104.1006, and 105.661 of the Revised Statutes of Missouri (RSMo), as amended. Management has prepared the basic financial statements of MOSERS and is responsible for the integrity and fairness of the information presented. Some amounts included in the financial statements and elsewhere may be based on estimates and judgments. These estimates and judgments were products of the best business practices available. The accounting policies followed in preparing the basic financial statements conform with U.S. generally accepted accounting principles. Financial information presented throughout the CAFR is consistent with that which is displayed in the basic audited financial statements.

Ultimate responsibility for the CAFR and the basic financial statements rests with the board of trustees. The executive director and the MOSERS staff assist board members in fulfilling their responsibilities. Systems of internal controls and proper records are maintained. These controls include standards in the hiring and training of employees, the establishment of an organizational structure, and the communication of policies and guidelines throughout the organization. Internal controls are reviewed through internal audit programs and all internal audit reports are submitted to the board of trustees.

Williams-Keepers, LLC conducted an independent audit of the basic financial statements in accordance with U.S. generally accepted auditing standards. This audit is described in the Independent Auditors' Report on page 17 in the Financial Section. Management has provided the external auditors with full and unrestricted access to MOSERS’ staff to discuss their audit and related findings, to facilitate independent validation of the integrity of the plan’s financial reporting, and verify the adequacy of the internal controls in place.

Management’s Discussion and Analysis in the Financial Section serves as an introduction to and overview of the financial statements. Additional financial information can be found in the financial statements and schedules included in the Financial Section of this report.

MOSERS is considered a component unit of the state of Missouri for financial reporting purposes and, as such, the financial statements in this report are also included in the State of Missouri Comprehensive Annual Financial Report.
Profile of MOSERS
MOSERS is a body corporate and an instrumentality of the state of Missouri that was established in 1957 by state law, under the management of a board of trustees, for the purpose of providing retirement benefits to most state employees. MOSERS provides for those retirement benefits through pension trust funds, in keeping with the fiduciary responsibilities of the board members, staff, and certain outside service providers. As of June 30, 2017, MOSERS serves more than 49,000 active employees and pays benefits to more than 47,000 benefit recipients.

Subsequent to its creation, MOSERS was further assigned the task of providing most members of the retirement system with term life and long-term disability insurance. MOSERS maintains an internal service fund to account for the flow of funds related to this insurance and contracts with insurance companies to provide those benefits through insured defined benefit plans. MOSERS maintains membership information on those eligible for the insurance coverage and collects and remits the premiums to the insurance company. Currently, the life and long-term disability insurance plans are insured through a third-party, The Standard insurance company, with oversight by MOSERS.

The State of Missouri Deferred Compensation Plan is administered through a contractual relationship with ICMA-RC as the third-party record keeper with oversight by MOSERS. Investment options are made available to participants who retain responsibility for the investment of their individual accounts. Administrative costs are accounted for through an internal service fund by MOSERS. Separate audited financial statements are issued by the Deferred Compensation Plan reflecting member investments.

The board also has responsibility for oversight of the CURP, a mandatory 401(a) defined contribution plan for new education employees hired after June 30, 2002, by the regional colleges and universities that participate in MOSERS. The employer contribution rate (5.89% in FY17) is 1% less than the employer normal cost of the defined benefit plan for general state employees. TIAA is responsible for third-party administration and for providing investment products and education to plan members.

Funded Status and Valuation Results
The board adopts actuarial assumptions based upon experience studies conducted at least every five years. The most recent experience study was adopted effective June 30, 2016. The most notable changes from this study included the adoption of updated mortality tables and a reduction in the investment return assumption from 8.0% to 7.65%. The board also committed to reducing the investment return assumption by .15% each year until the rate reaches 7.05%. For the June 30, 2017 valuation, the investment return assumption was reduced to 7.50% based upon the commitment made by the board in FY16.

For funding purposes, the actuarial value of assets (AVA), which is a smoothed value that recognizes investment gains and losses on the AVA over a rolling five-year period, is used to determine funding levels. For the amortization of the unfunded actuarial accrued liability (UAAL), MOSERS uses a closed amortization period with 27 years remaining.

As of June 30, 2017, MSEP was 67.5% pre-funded and the Judicial Plan was 26.9% pre-funded. MSEP reflected a decrease from the June 30, 2016 funded status of 69.6% and the Judicial Plan reflected an increase from the June 30, 2016, funded status of 26.2%.

For financial statement purposes, a net pension liability (NPL) is presented instead of the UAAL. The NPL is calculated using the market value of assets to determine the fiduciary net position in accordance with GASB 67. As of June 30, 2017, the fiduciary net position as a percentage of total pension liability was 60.41% for MSEP and 24.39% for the Judicial Plan.

The required opinion letter from the board’s retained actuary, Cavanaugh Macdonald, is contained on page 89. Additional information regarding the financial condition of the pension trust funds can be found in the Actuarial Section of this report.

Plan Membership
During a 2010 special legislative session, the General Assembly authorized new benefit tiers known as the “MSEP 2011” and the “Judicial Plan 2011.” These tiers affect MSEP and Judicial Plan members employed for the first time on or after January 1, 2011. With the total MSEP active membership of 48,910, the MSEP 2011 represents approximately 39% of that membership. With the total Judicial Plan active membership of 410, the Judicial Plan 2011 represents approximately 32% of that membership. As active membership increases in these new tiers, there is a decreasing component in the annual employer contribution. Over time, these new benefit tiers will result in a significant savings to the employer while continuing to provide a reasonable benefit in retirement for our state employees.
Missouri State Employees' Retirement System / Fiscal Year 2017

Introducory Section

Investments
MOSERS’ investments generated a time-weighted return of 3.5%, net of fees, for FY17. The total fund returned 1.9% more than would have been expected through passive investing. Additional information regarding the investments of the pension trust funds can be found in the Investment Section of this report.

Legislative Changes During FY 2017
- House Bill 5 – The General Assembly and the Governor authorized the appropriation of $393 million to MOSERS for FY18 which fully funded the board-certified employer contribution rates.
- Senate Bill 62 – SB 62 included several provisions that affect MOSERS. Effective January 1, 2018, the vesting period for most MSEP 2011 members will be reduced from 10 years to 5 years. Additionally, new terminated-vested members of MSEP 2011 will: 1) not be eligible to receive service credit for sick leave accruals, 2) not have survivor benefits payable at the time of death but rather at the time when the member would have been eligible for normal retirement, and 3) have cost-of-living adjustments begin on the second anniversary of retirement, rather than on the first anniversary of retirement. These three items combined with the vesting changes resulted in a decrease of approximately $1.7 million in plan liability.

SB 62 set the employer contribution rate to CURP at 6% rather than being 1% below MOSERS’ employer normal cost effective July 1, 2018 (FY19). This bill also requires new employees hired on or after July 1, 2018 to contribute 2% of payroll to the CURP.

SB 62 allowed the MOSERS Board of Trustees to choose to establish a buyout program for terminated-vested members with the program authorization expiring May 31, 2018. The board subsequently voted to implement the program by offering a buyout amount equal to 60% of the present value of the future normal retirement benefit calculated using a 7.50% discount rate. The program is completely voluntary and provides another benefit option to approximately 17,000 members who are no longer working in a benefit eligible position with the state and are not yet eligible to retire. Payments will be made after November 30, 2017.
- Senate Bill 34 – Provisions were modified relative to pension forfeiture and a public employee who commits a job-related felony. Original pension forfeiture provisions were passed in 2014. SB 34 provided for the employer to notify the affected retirement plan, rather than the court, when an employee is convicted, rather than “found guilty” of a felony in direct connection of job duties.

Administrative Initiatives
Project Phoenix
During FY17, MOSERS began the process of replacing its 30-year-old pension administration system with a new system that has been named “Phoenix.” Six staff members have been dedicated to work full time on the project and others will be assisting on a part-time basis. MOSERS hired Linea Solutions to assist in the development of a comprehensive request for proposal document and hired Icon Integration to lead our data cleansing efforts in preparation for future conversion activities. We anticipate that a software vendor will be selected in mid FY18.

Vendor Contracts
A process was initiated to review and bid long-term consulting contracts which resulted in substantial savings to the systems. Cavanaugh Macdonald was hired as the actuarial consultant resulting in annual savings estimated at $57,000. TIAA was retained to continue as the CURP third-party administrator, but the bid process resulted in investment line-up improvements which included a fee reduction of approximately 36% in total record keeping and investment option expenses (approximately $176,000 annually), and the general asset consultant fees were reduced by approximately $234,000 per year.

Budgeting
The MOSERS Board of Trustees annually approves the administrative expense budgets for MOSERS’ operations and investment departments. MOSERS’ governance policy requires an exception report to the board of trustees by the executive director if expenses are expected to exceed budgeted amounts by 10% and to seek board approval in advance for any unscheduled salary increases or staff expansions not included in the budget approved by the board before the beginning of the fiscal year. There were no budget exceptions to report for the year.
Awards
MOSERS was awarded the Certificate of Achievement for Excellence in Financial Reporting by the Government Finance Officers Association of the United States and Canada (GFOA) for its comprehensive annual financial report for the fiscal year ended June 30, 2016. This was the 28th consecutive year that MOSERS has received this prestigious award. In order to be awarded a Certificate of Achievement, a government must publish an easily readable and efficiently organized comprehensive annual financial report. The report must satisfy generally accepted accounting principles and applicable legal requirements. A Certificate of Achievement is valid for a period of one year only. We believe that our current comprehensive annual financial report continues to meet the Certificate of Achievement Program's requirements and we are submitting it to the GFOA to determine its eligibility for another certificate.

MOSERS received the Public Pension Coordinating Council (PPCC), Public Pension Standards Award, in recognition of meeting the professional standards for plan design and administration as set forth in the Public Pension Standards. This award is presented by the PPCC, a confederation of the National Association of State Retirement Administrators (NASRA), the National Conference on Public Employee Retirement Systems (NCPERS), and the National Council on Teacher Retirement (NCTR).

These prestigious awards recognize MOSERS for financial and professional standards of excellence and are gratifying to MOSERS' staff. These notable awards can be viewed on page 5.

Conclusion
This report is a product of the combined efforts of MOSERS' staff and advisors functioning under the board's leadership. It is intended to provide complete and reliable information that facilitates the management decision making process, serves as a means for determining compliance with legal requirements, and allows for the evaluation of responsible guardianship of system funds. MOSERS received an unmodified opinion from our independent auditor on the financial statements included in this report. The opinion of the independent auditor is on page 17.

Copies of this report are provided to the Governor, State Auditor, the Joint Committee on Public Employee Retirement of the General Assembly, and all state agencies that form the link between MOSERS and its members. Their cooperation contributes significantly to the success of MOSERS.

As the spotlight continues to shine on public pensions, it is important to remember the genesis of the MOSERS retirement benefit as a component of the employer's total compensation package to recruit and retain quality employees. With the average MOSERS retirement benefit being $15,700 annually, an employee, after a career of state service, receives this element of deferred compensation, which contributes to the societal benefit of a dignified retirement. It is our honor to be a part of this process and work for this great state and Missouri's public employees.

Respectfully submitted,

John Watson
Executive Director
Letter from the Board Chairwoman

October 16, 2017

Dear Members:

On behalf of the board of trustees, I am pleased to present the MOSERS Comprehensive Annual Financial Report for the fiscal year ended June 30, 2017. With 2017 being the 60th anniversary of MOSERS, it is more evident than ever that the data and message contained in this report echoes all that is MOSERS as an organization: transparent, informative, educational, and enduring.

During FY17, the MOSERS Board of Trustees confirmed its commitment to sound financial practices by adopting more conservative investment return assumptions to reflect capital market expectations. While this movement in assumptions will result in higher annual employer contribution requirements in the short-term, it is the board’s expectation that these changes will strengthen MOSERS’ financial position and will ultimately enhance the retirement security of our members.

Public pension plans continue to experience heightened attention and MOSERS is no exception. As news articles continue to highlight important, and sometimes difficult, decisions being made by members of the General Assembly, the Governor, and the members of the MOSERS Board of Trustees, it is important to emphasize that state employee pensions are secure and MOSERS is well positioned to continue in its mission to “advance the financial security of its members.”

In Missouri, the Governor and the legislature have demonstrated a commitment to contributing the full amount needed each year to pay promised benefits to retirees. The commitment from the state has been consistent since MOSERS’ inception – and was evident this year as the board-certified contribution rate was fully funded for FY18.

As is often the case after an election cycle, the board experienced significant turnover this year. On behalf of the board and staff, I would like to recognize and thank State Treasurer Clint Zweifel, Senator Joe Keaveny, Representative Caleb Jones, Representative Mike Leara, and Commissioner Doug Nelson for their hard work and dedication while serving as trustees to the system. Five new trustees were added to the board during FY17 with those being State Treasurer Eric Schmitt, Senator Gina Walsh, Representative Mike Bernskoetter, Representative John Wiemann, and Commissioner Sarah Steelman. Trustees devote many hours in fulfilling their fiduciary duties and our new trustees have been active contributors to board discussion and decisions.

I wish to thank the board for their contributions this year as well as the staff for maintaining a high level of expertise and professionalism. I also wish to express my appreciation to you, our members, for your public service to this great state and your dedication and commitment to the citizens of Missouri. If you ever have any questions, please contact us at MOSERS, P.O. Box 209, Jefferson City, Missouri 65102, call us at (800) 827-1063, or visit our website at www.mosers.org.

Sincerely,

Shannon Owens, Chairwoman – Board of Trustees
Board of Trustees

Shannon Owens – Chairwoman
Elected Active Member

Crystal Wessing – Vice Chair
Elected Active Member

Representative Mike Bernskoetter
House Appointed Member

Lloyd J. "Joe" Carmichael
Governor Appointed Member

Don Martin
Elected Retired Member

State Treasurer Eric Schmitt
Ex-Officio Member

Antwaun Smith
Governor Appointed Member

Commissioner Sarah Steelman
Office of Administration
Ex-Officio Member

Senator Wayne Wallingford
Senate Appointed Member

Senator Gina Walsh
Senate Appointed Member

Representative John Wiemann
House Appointed Member
Administrative Organization

John Watson
Executive Director

- Jake McMahon, Chief Counsel
- Nicki Russell, Chief Auditor
- Ronda Stegmann, Legislative & Policy Coordinator
- Lisa Verslues, Human Resources Coordinator
- Lori Woratzek, Chief Finance Officer

Mark J. Murphy
Deputy Executive Director • Operations
Chief Operations Officer

- Stacy Gillmore, Chief Technology Officer
- Lori Leeper, Board & Operations Projects Coordinator
- Carson Lepper, Project Manager
- Pam Palmquist, Chief Benefits Officer
- Cindy Rehmeier, Manager – Defined Contribution Plans
- Candy Smith, Communications & Strategic Planning Coordinator

Seth Kelly
Deputy Executive Director • Investments
Chief Investment Officer

- Shannon Davidson, Deputy Chief Investment Officer
- Patrick Morgan, Investment Legal & Compliance Counsel
- Scott Peppard, Manager – Illiquid Alpha Strategies
- Tyson Rehfeld, Manager – Global Rates & Credit
Purpose
MOSERS was established September 1, 1957, and is governed by laws of the state of Missouri.
MOSERS provides retirement, survivor, and disability benefits, as well as life insurance and deferred compensation plan management to its members.
MOSERS administers benefits for most state employees, including members of the Missouri General Assembly, elected state officials, and judges. MOSERS is responsible for administering the law in accordance with the expressed intent of the Missouri General Assembly and bears a fiduciary obligation to the state employees who are its members and beneficiaries.

Administration
State law provides that responsibility for the administration of MOSERS is vested in an 11-member board of trustees. The board is comprised of the following:
• two members of the Senate appointed by the President Pro Tem of the Senate;
• two members of the House of Representatives appointed by the Speaker of the House;
• two members appointed by the Governor;
• the State Treasurer;
• the Commissioner of Administration; and
• three other system members: two active members elected by the active and terminated-vested members, and one retiree elected by the retired members.
The day-to-day management of MOSERS is delegated to the executive director who is appointed by the board and serves at its pleasure. The executive director acts as advisor to the board on all matters pertaining to the system, contracts for professional services, and employs the remaining staff needed to manage the system.
Organization
The executive director, chief operations officer, chief finance officer, and chief investment officer are responsible for planning, organizing, and administering the operations of the system under the broad policy guidance and direction of the board.

Executive
The executive staff provide administrative support by assisting the executive director, chief operations officer, and chief finance officer in the major legal, financial, operational, and oversight functions. Human resources, which includes oversight of general building maintenance, is also represented in this section.

MOSERS’ office is divided into six administrative sections that perform specific functions for the system.

Benefits
Staff in the benefits section are responsible for all member data, benefit verifications and inceptions, as well as contact with members regarding the benefit programs administered by MOSERS (retirement, life insurance, and long-term disability insurance). They also conduct educational seminars in 16-plus cities around the state each year and host webinars to inform members about their MOSERS benefits.

Communications
Communications staff are responsible for presenting information in clear and concise ways to facilitate effective, well-informed decision-making, planning, and action. They produce materials for members regarding the benefits administered by MOSERS including publications such as newsletters, handbooks, forms, brochures, and the annual report. Additionally, this team works in conjunction with information technology staff on electronic materials and tools such as the public, board, secure member, and internal websites. This section coordinates activities and processes for the organization that facilitate strategic thinking, planning, and implementation.

Finance
The staff in this section are responsible for all financial records of the programs administered by MOSERS, including the preparation of financial and statistical reports and purchasing functions for MOSERS. They interface with the investment custodian, internal investment managers, Office of Administration accounting, state of Missouri employers, life insurance companies, actuaries, banks, and the IRS. They are also responsible for all billing, payment processing, and balancing of member and employer contributions.

Information Technology
The information technology section provides computer and technical design support for MOSERS’ data processing activities. This team is responsible for developing and maintaining the automated systems used to administer benefits. They are also responsible for the document imaging system, network, unified communication system, and personal computers. Information technology and communications staff are jointly responsible for MOSERS’ websites.

Investments
The investments staff provides investment management and consulting services to the system. Primary functions include managing assets internally, selecting external managers for portions of the portfolio, researching and implementing portfolio allocation shifts and rebalancing, providing technical advice, serving as a liaison to the investment community, and informing and advising the board and executive director on financial, economic, and political developments which may affect the system. The investments staff works closely with external investment consultants, legal counsel, and the executive director.

Project Management
The responsibilities of staff in this area include benchmarking, business continuity preparation and planning, business process mapping and analysis to identify efficiencies and mitigate risk. They are also the core staff responsible for the selection and implementation efforts of a new pension administration solution to replace MIBS. This includes working closely with multiple external vendors focused on data preparation and systems design.
Outside Professional Services

Actuary
• Cavanaugh Macdonald Consulting, LLC

Auditor
• Williams-Keepers, LLC

Governmental Consultant
• Gamble & Schlemeier, Ltd.

Legal Counsel
• Purrington Moody Weil, LLP
• Thompson Coburn, LLP

Master Custodian
• Bank of New York Mellon

Investment Management Consultants
• Albert A. Slawsky
  Board Asset Consultant
• Blackstone Alternative Asset Management, LP
  Hedge Fund Asset Consultant
• Summit Strategies Group
  General Asset Consultant
• TimberLink Consulting, LLC
  Timberland Consultant

Risk Management Consultant
• Charlesworth & Associates, LC

Third-Party Administrators
• ICMA-RC
  Deferred Compensation Plan
• The Standard
  Life Insurance and Long-Term Disability Insurance
• TIAA
  College and University Retirement Plan

Securities Lending Advisor
• Deutsche Bank AG, New York Branch

Information Technology Consulting
• Avtex Solutions, Inc.
• Dell
• Huber & Associates, Inc.

Pension System Administration Consulting
• ICON Integration and Design, Inc.
• Linea Solutions

Investment Risk Management
• MSCI BarraOne

Investment Advisors
• Actis Emerging Markets, LLP
• Alinda Capital Partners, LLC
• Alliance Bernstein Defined Contribution Investments
• AQR Capital Management, LLC
• Axiom Asia Private Capital
• Axxon Management, LP
• Bayview Asset Management, LLC
• BlackRock Financial Management, Inc.
• Blackstone Alternative Asset Management, LP
• Blackstone Real Estate Advisors
• Blakeney Management, Ltd.
• Bridgewater Associates, LP
• Campbell Global
• CarVal Investors, LLC
• Catalyst Capital Group, Inc.
• Catterton Partners
• Cornwall Capital Management, LP
• Davidson Kempner Capital Management, LLC
• Development Partners International
• DRI Capital, Inc.
• EIG Global Energy Partners, LLC
• Elliott International Capital Advisors, Inc.

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Outside Professional Services continued from page 15

- Eton Park Capital Management, LP
- Farallon Capital Management, LLC
- Gaoling Fund, LP
- Glenview Capital Management, LLC
- Global Forest Partners, LP
- Harvest Fund Advisors, LLC
- HBK Investments, LP
- JLL Partners, LP
- King Street Capital Management, LP
- Linden Capital Partners, LLC
- MAST Capital Management, LLC
- Merit Energy Company
- MHR Institutional Partners, LLC
- Millennium Technology Value Partners, LP
- Moon Capital Management, LP
- NISA Investment Advisors, LLC
- Oaktree Capital Management, LP
- Pacific Alternative Asset Management Company, LLC
- Perry Partners, LLC
- Pharo Global Advisors, Ltd.
- Resource Management Service, LLC
- Silchester International Investors
- Silver Creek Capital Management, LLC
- Silver Lake Partners, LP
- Silver Point Capital, LP
- SIR Capital Management, LP
- Siris Capital Group, LLC
- State Street Global Advisors
- StepStone Group
- Stone Harbor Investment Partners, LP
- Viking Global Investors, LP
- Visium Asset Management, LP
- Voya Financial
- Wellington Management Company, LLP

Investment management, custodial and consulting fees can be found in the Schedule of Investment Manager Fees on page 79. Schedules of broker commissions can be found on page 82. Additional information on investment managers can also be found in the Investment Section of this report.
In 1975, the multiplier used for calculating benefits was increased to 1.25% (originally, it was 5/6 of 1% in 1957). By 1977, the average monthly benefit payment was $108 ($1,294 per year). MOSERS paid a total of $8.23 million to 6,361 retired workers in 1977.
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Independent Auditors’ Report

The Board of Trustees
Missouri State Employees’ Retirement System

We have audited the accompanying financial statements of the pension trust and internal service funds of the Missouri State Employees’ Retirement System (MOSERS), a component unit of the State of Missouri, as of and for the year ended June 30, 2017, and the related notes to the financial statements, which collectively comprise the MOSERS’ basic 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 opinions on these financial statements based on our audit. We conducted our audit in accordance with U.S. generally accepted auditing standards. 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 the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinions.

Opinions
In our opinion, the financial statements referred to above present fairly, in all material respects, the respective financial position of the pension trust and internal service funds of MOSERS as of June 30, 2017, and the respective changes in financial position and, where applicable, cash flows thereof for the year then ended in conformity with U.S. generally accepted accounting principles.

Other Matters
Required Supplementary Information
U.S. generally accepted accounting principles require that the Management’s Discussion and Analysis on pages 19-23 and the Schedule of Changes in Employers’ Net Pension Liability, Schedule of Employer Contributions, Schedule of Annual Money-Weighted Rate of Return on Investments, and the Notes to the Schedules of Required Supplementary Information on pages 51-58 be presented to supplement the basic financial statements. Such information, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board, who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context.
We have applied certain limited procedures to the required supplementary information in accordance with U.S. generally accepted auditing standards, 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 basic financial statements, and other knowledge we obtained during our audit of the basic 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.

Other Information
Our audit was conducted for the purpose of forming opinions on the financial statements that collectively comprise MOSERS’ basic financial statements. The Introductory, Investment, Actuarial, and Statistical Sections and the additional information on pages 59-64 are presented for purposes of additional analysis and are not a required part of the financial statements.

The additional information presented on pages 59-64 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. Such information has been subjected to the auditing procedures applied in the audit of the basic financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the basic financial statements or to the basic financial statements themselves, and other additional procedures in accordance with U.S. generally accepted auditing standards. In our opinion, the additional information presented on pages 59-64 is fairly stated in all material respects in relation to the basic financial statements as a whole.

The Introductory, Investment, Actuarial, and Statistical Sections have not been subjected to the auditing procedures applied in the audit of the basic financial statements and, accordingly, we do not express an opinion or provide any assurance on them.

October 16, 2017
Management's Discussion and Analysis

This discussion and analysis of the Missouri State Employees’ Retirement System (MOSERS) provides an overview of the retirement system's financial activities for the fiscal year ended June 30, 2017. It is intended to be used in conjunction with the Transmittal Letter beginning on page 6 and Financial Statements and Notes to the Financial Statements, on pages 24-50 of this report.

Using This Financial Report

This Comprehensive Annual Financial Report (CAFR) reflects the activities of MOSERS as reported in the Statements of Fiduciary Net Position and the Statements of Changes in Fiduciary Net Position, which begin on page 24. These statements are prepared in conformity with generally accepted accounting principles. The Notes to the Financial Statements are an integral part of the financial statements and include additional information not readily evident in the statements themselves. The Required Supplementary Information (RSI) and Additional Financial Information following the Notes to the Financial Statements provide historical information and additional details considered useful in evaluating the condition of the plan.

Investment data in the Financial Section is presented at fair value. See the Actuarial Section of this report for a detailed discussion of the actuarial value of assets and liabilities and the funded status of the plans.

The basic financial statements contained in this section of the CAFR consist of:

- The Statements of Fiduciary Net Position which report the pension trust funds’ assets, liabilities, and resulting net position where total assets less current liabilities equal net position held in trust for future pension benefits available at the end of the fiscal year. It is a snapshot of the financial position of the pension trust funds at that specific point in time.
- The Statements of Changes in Fiduciary Net Position which summarize the pension trust funds’ financial transactions that have occurred during the fiscal year where additions less deductions equal net change in net position. It supports the change that has occurred to the prior year's net position on the Statements of Fiduciary Net Position.
- The Statements of Net Position of the internal service funds is similar to the Statements of Fiduciary Net Position in that it is also a snapshot of the financial position of the internal service funds where net position plus liabilities equals assets.
- The Statements of Revenues, Expenses, and Changes in Net Position of the internal service funds is similar to the Statements of Changes in Fiduciary Net Position in that it also reports a summary of the financial activity that occurred over the period of the fiscal year where revenues less expenses equals net revenue and supports the change to the prior year's net position.
- The Statements of Cash Flows of the internal service funds report the financial transactions of the fiscal year of the internal service funds on a cash basis. It is similar to the Statements of Revenues, Expenses and Changes in Net Position; however, the focus of this statement is on the change to cash balances with accrued income and expense items eliminated.
- The Notes to the Financial Statements are an integral part of the above financial statements and include additional information not readily evident in the statements themselves.

Management's Discussion and Analysis, the Required Supplementary Information, and Additional Financial Information following the Notes to the Financial Statements provide detailed historical information considered useful in evaluating the condition of the plans administered by MOSERS.

Funding Analysis

The unfunded actuarial accrued liability (UAAL) for MSEP increased by $0.41 billion from $3.87 billion at June 30, 2016 to $4.28 billion at June 30, 2017 with a corresponding decrease in funded percentage from 69.6% to 67.5%. The UAAL for the Judicial Plan increased by $8.44 million from $404.15 million at June 30, 2016 to $412.59 million at June 30, 2017 with a corresponding increase in funded percentage from 26.2% to 26.9%. The primary reason for the increase in the UAAL in both plans was a reduction in the assumed rate of investment return from 7.65% to 7.50%. Other actuarial assumptions remained consistent with the June 30, 2016 valuation.

To determine the UAAL of the plans, MOSERS uses a smoothed value of assets which recognizes market gains and losses on the actuarial value of assets over a five-year open period. For GASB 67 financial statement reporting purposes, the market value of assets is used to determine plan net position. The plan net position as a percentage of total pension liability decreased from 63.6% at June 30, 2016 to 60.41% at June 30, 2017 for MSEP and increased from 24.11% to 24.39% for the Judicial Plan.
Financial Reporting Highlights

- MOSERS’ net position restricted for pensions decreased by $158.2 million during FY17. On June 30, 2017, total plan assets (including net capital assets of $3.3 million) were $11.5 billion, exceeding total liabilities of $3.4 billion, resulting in a net position held in trust for pension benefits of $8.1 billion.

- Covered payroll, from which both employee and employer contributions are calculated, increased $20.4 million for the Missouri State Employees’ Plan (MSEP) and $0.7 million for the Judicial Plan, or 1.1% and 1.3% respectively, over the last fiscal year.

- Total contributions for FY17 were $401.4 million, up from $390.1 million in FY16. Based upon the June 30, 2015 actuarial valuation, the FY17 actuarial required employer contribution rates were determined to be 16.34% for the MSEP and 55.76% for the Judicial Plan. However, the actual rates were set per the board’s policy minimum contribution rates at 16.97% for the MSEP and 58.45% for the Judicial Plan. Although not prohibited to increase, future contribution rates shall not be reduced below the rate set by the June 30, 2013 valuation until the actuarial funding ratio of the plans are at least 80%. Investment and securities lending income, net of related fees was $276.7 million. Investments of the pension trust funds generated a time-weighted rate of return of 3.5%, net of fees, for the year, up from the prior year’s return of 0.3%. The money-weighted rate of return, net of investment expenses as defined by GASB 67 was 3.51% for FY17.

- Investment activity expenses were $140.3 million in FY17, up from $79.1 million in FY16. Although management fees were reduced by $6.2 million from FY16 and fund pass-through expenses were reduced by approximately $2 million, this overall increase is due to paying $70 million more in incentive fees to external investment managers as a result of the performance of the funds they manage in FY17 as compared to FY16.

- Member benefit payments were $821.3 million in FY17, up $37.9 million from $783.4 million in FY16. Service transfers and refunds totaled $6.7 million in FY17, down $0.2 million from $6.9 million in FY16.

- Administrative expenses totaled $8.9 million in FY17, compared to $8.6 million in FY16.

- The internal service fund’s net position increased by $0.3 million. The increase is due to reimbursement from the State of Missouri Deferred Compensation Plan’s third-party record keeper to cover administrative expenses occurring in FY17 and future years.

The following schedules present Summary Comparative Financial Statements of the pension trust funds and internal service funds for FY17 and FY16. For each schedule, there is a brief summary of the significant changes noted in those schedules.

Pension Trust Funds

Summary Comparative Statements of Fiduciary Net Position

The largest components of the net position of the pension trust funds are the investments, cash and short-term investments, and obligations under repurchase agreements.

MOSERS experienced a slight decrease in the net fair value of investments (total investments less obligations under repo agreements) of $103 million, from $5.7 billion in FY16 to $5.6 billion in FY17, primarily attributable to benefit payment obligations exceeding contribution revenue and lower than expected investment returns as evidenced by MOSERS’ total investment return, net of fees, of 3.5% this year. Detailed information regarding MOSERS’ investment portfolio is included in the Investment Section of this report.

Obligations under repurchase agreements decreased from $3.6 billion in FY16 to $3.4 billion in FY17 due to decreased exposure financed with reverse repurchase agreements.

Cash and short-term investments decreased slightly due to multiple factors including benefit payment obligations exceeding contribution revenue, the timing of investment funding and obligations under derivative investments and reverse repurchase agreements.

Investment sales receivable decreased as a result of the timing of investment purchases.

The decrease in securities lending collateral is due to the investment portfolio not having any securities on loan or collateral held at fiscal year-end.
## Pension Trust Funds

### Summary Comparative Statements of Fiduciary Net Position

<table>
<thead>
<tr>
<th></th>
<th>As of June 30, 2017</th>
<th>As of June 30, 2016</th>
<th>Amount of Change</th>
<th>Percentage Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash and short-term investments</td>
<td>$2,417,955,050</td>
<td>$2,454,419,406</td>
<td>$ (36,464,356)</td>
<td>(1.49)%</td>
</tr>
<tr>
<td>Receivables</td>
<td>43,498,874</td>
<td>89,911,461</td>
<td>(46,412,587)</td>
<td>(51.62)%</td>
</tr>
<tr>
<td>Investments</td>
<td>9,018,590,792</td>
<td>9,349,306,746</td>
<td>(330,715,954)</td>
<td>(3.54)%</td>
</tr>
<tr>
<td>Invested securities lending collateral</td>
<td>0</td>
<td>14,258,587</td>
<td>(14,258,587)</td>
<td>(100.00)%</td>
</tr>
<tr>
<td>Net capital assets</td>
<td>3,316,060</td>
<td>3,541,901</td>
<td>(225,841)</td>
<td>(6.38)%</td>
</tr>
<tr>
<td>Other assets</td>
<td>105,911</td>
<td>68,128</td>
<td>37,783</td>
<td>55.46%</td>
</tr>
<tr>
<td><strong>Total assets</strong></td>
<td>$11,483,466,687</td>
<td>$11,911,506,229</td>
<td>$(428,039,542)</td>
<td>(3.59)%</td>
</tr>
<tr>
<td>Administrative expense payables</td>
<td>2,434,501</td>
<td>2,419,569</td>
<td>14,932</td>
<td>0.62%</td>
</tr>
<tr>
<td>Investment purchase payables</td>
<td>10,165,707</td>
<td>36,690,153</td>
<td>(26,524,446)</td>
<td>(72.29)%</td>
</tr>
<tr>
<td>Securities lending collateral</td>
<td>0</td>
<td>14,940,141</td>
<td>(14,940,141)</td>
<td>(100.00)%</td>
</tr>
<tr>
<td>Other liabilities</td>
<td>9,470,802</td>
<td>10,083,285</td>
<td>(612,483)</td>
<td>(6.07)%</td>
</tr>
<tr>
<td>Obligations under repurchase agreements</td>
<td>3,373,773,555</td>
<td>3,601,461,597</td>
<td>(227,688,042)</td>
<td>(6.32)%</td>
</tr>
<tr>
<td>MOSERS investment portfolio liability (MIP)</td>
<td>4,628,883</td>
<td>4,693,919</td>
<td>(65,036)</td>
<td>(1.39)%</td>
</tr>
<tr>
<td><strong>Total liabilities</strong></td>
<td>$3,400,473,448</td>
<td>$3,670,288,664</td>
<td>$(269,815,216)</td>
<td>(7.35)%</td>
</tr>
<tr>
<td><strong>Net positions restricted for pensions</strong></td>
<td>$8,082,993,239</td>
<td>$8,241,217,565</td>
<td>$(158,224,326)</td>
<td>(1.92)%</td>
</tr>
</tbody>
</table>

### Summary Comparative Statements of Changes in Fiduciary Net Position

The increase in contributions received is primarily attributable to an increase in covered payroll from FY16 to FY17.

The increase in investment income from FY16 to FY17 is attributable to an improvement in market conditions experienced by the investments of the fund. The increase in securities lending income is primarily due to higher lending margins in the lending portfolio during the fiscal year. The **Investment Section** of this report contains additional information regarding investments and securities lending activity.

The total benefit payments increased as a result of an increase in the number of benefit recipients plus cost-of-living adjustments provided to existing benefit recipients. Detailed schedules of these changes can be viewed on pages 100-107 of the **Actuarial Section** of this report.

Service transfer payments decreased $1.2 million in FY17 and are dependent on the number of members electing to transfer their service out of MOSERS. Refunds of employee contributions are the result of the number of members of the MSEP 2011 tier who have terminated employment and are eligible to request a refund, as well as members employed prior to September 1, 1972 who have contributions remaining in the system. Refunds increased in FY17 by $1 million due to a larger number of terminated-nonvested MSEP 2011 members choosing to receive a refund.

### Pension Trust Funds

#### Summary Comparative Statements of Changes in Fiduciary Net Position

<table>
<thead>
<tr>
<th></th>
<th>Year Ended June 30, 2017</th>
<th>Year Ended June 30, 2016</th>
<th>Amount of Change</th>
<th>Percentage Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contributions</strong></td>
<td>$401,359,185</td>
<td>$390,869,615</td>
<td>$10,489,570</td>
<td>2.68%</td>
</tr>
<tr>
<td>Investment income – investing activities</td>
<td>$276,722,915</td>
<td>$1,213,744</td>
<td>275,509,171</td>
<td>22,699.12%</td>
</tr>
<tr>
<td>Investment income (loss) – securities lending activities</td>
<td>21,896</td>
<td>(49)</td>
<td>21,945</td>
<td>44,785.71%</td>
</tr>
<tr>
<td>Miscellaneous income</td>
<td>530,988</td>
<td>554,655</td>
<td>(23,667)</td>
<td>(4.27)%</td>
</tr>
<tr>
<td><strong>Total additions</strong></td>
<td>678,634,984</td>
<td>392,637,965</td>
<td>285,997,019</td>
<td>72.84%</td>
</tr>
<tr>
<td><strong>Benefits</strong></td>
<td>821,280,165</td>
<td>783,420,118</td>
<td>37,860,047</td>
<td>4.83%</td>
</tr>
<tr>
<td>Service transfers and refunds</td>
<td>6,669,417</td>
<td>6,880,099</td>
<td>(210,682)</td>
<td>(3.06)%</td>
</tr>
<tr>
<td>Administrative expenses</td>
<td>8,909,728</td>
<td>8,626,358</td>
<td>283,370</td>
<td>3.28%</td>
</tr>
<tr>
<td><strong>Total deductions</strong></td>
<td>836,859,310</td>
<td>798,926,575</td>
<td>37,932,735</td>
<td>4.75%</td>
</tr>
<tr>
<td><strong>Net (decrease)</strong></td>
<td>(158,224,326)</td>
<td>(406,288,610)</td>
<td>248,064,284</td>
<td>61.06%</td>
</tr>
<tr>
<td>Net positions beginning of year</td>
<td>8,241,217,565</td>
<td>8,647,506,175</td>
<td>(406,288,610)</td>
<td>(4.70)%</td>
</tr>
<tr>
<td><strong>Net positions restricted for pensions</strong></td>
<td>$(8,082,993,239)</td>
<td>$(8,241,217,565)</td>
<td>$(158,224,326)</td>
<td>(1.92)%</td>
</tr>
</tbody>
</table>
Internal Service Funds

Summary Comparative Statements of Net Position Analysis
The increase in premiums receivable is attributable to normal fluctuations in the month-end balance of life and long-term disability insurance premiums receivable during the year, which are dependent on the number of members participating and amount of their coverage.

The increase in investments is attributable to reimbursement from the State of Missouri Deferred Compensation Plan’s third-party record keeper to cover administrative expenses in FY17 and future years.

The decrease in premiums payable and increase in other liabilities is attributable to a reclassification of year-end balances of deferred revenue in the long-term disability program.

Summary Comparative Statements of Revenues, Expenses, and Changes in Net Position Analysis
Premium receipts and premium disbursements decreased due to a change in method for recording deferred revenue in the long-term disability program. Prior to FY17, amounts paid by the state in excess of amounts needed to pay The Standard were recorded as an expense and payable when received. These amounts were reclassified as deferred revenue in FY17.

Deferred compensation receipts and disbursements were $0.7 million for FY17. This is attributable to a $0.7 million reimbursement paid in FY17 to cover current and future administrative expenses to the internal service fund at MOSERS from the State of Missouri Deferred Compensation Plan’s third-party record keeper, which collects deferred compensation contributions directly from employers. As of June 30, 2017, there were 63,795 participants (both active and terminated/retired), which is a decrease of 1,109 from FY16. The state of Missouri has not contributed an employer match since March 2010.

Administrative expenses decreased primarily as a result of The Standard assuming the cost of a full-time employee to work onsite at MOSERS for the life insurance and long-term disability programs.

Summary Comparative Statements of Cash Flows Analysis
The increase in cash flows from operating activities is primarily attributable to the increase in deferred compensation receipts of $0.7 million to cover current and future administrative expenses.

The decrease in cash flows from noncapital financing activities is primarily attributable to an increase in the amount of life and long-term disability insurance premium refund checks that remained outstanding at year-end.

The decrease in cash flows from investing activities is attributable to several factors including the increase in outflows for net purchase and maturities of overnight repurchase agreements of $0.9 million.

Request for Information
This financial report is designed to provide a general overview of the system’s finances for all those interested in the system. Questions concerning any of the information provided in this report or requests for additional information should be addressed to MOSERS at P.O. Box 209, Jefferson City, MO 65102 or by email at mosers@mosers.org.
## Internal Service Funds

### Summary Comparative Statements of Net Position

<table>
<thead>
<tr>
<th></th>
<th>As of June 30, 2017</th>
<th>As of June 30, 2016</th>
<th>Amount of Change</th>
<th>Percentage Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premiums receivable</td>
<td>$967,091</td>
<td>$962,006</td>
<td>$5,085</td>
<td>0.53%</td>
</tr>
<tr>
<td>Investments</td>
<td>4,291,721</td>
<td>3,935,042</td>
<td>356,679</td>
<td>9.06%</td>
</tr>
<tr>
<td>Fixed assets net of accumulated depreciation</td>
<td>11,598</td>
<td>3,946</td>
<td>7,652</td>
<td>193.92%</td>
</tr>
<tr>
<td>Leasehold improvements</td>
<td>970</td>
<td>1,940</td>
<td>(970)</td>
<td>(50.00%)</td>
</tr>
<tr>
<td><strong>Total assets</strong></td>
<td>$5,271,380</td>
<td>$4,902,934</td>
<td>$368,446</td>
<td>7.51%</td>
</tr>
<tr>
<td>Premiums payable</td>
<td>$2,518,379</td>
<td>$4,550,931</td>
<td>$(2,032,552)</td>
<td>(44.66%)</td>
</tr>
<tr>
<td>Other liabilities</td>
<td>2,257,880</td>
<td>123,378</td>
<td>2,134,502</td>
<td>1,730.05%</td>
</tr>
<tr>
<td><strong>Total liabilities</strong></td>
<td>4,776,259</td>
<td>4,674,309</td>
<td>101,950</td>
<td>2.18%</td>
</tr>
<tr>
<td>Unrestricted net position</td>
<td>495,121</td>
<td>228,625</td>
<td>266,496</td>
<td>116.56%</td>
</tr>
<tr>
<td><strong>Total liabilities and net position</strong></td>
<td>$5,271,380</td>
<td>$4,902,934</td>
<td>$368,446</td>
<td>7.51%</td>
</tr>
</tbody>
</table>

### Summary Comparative Statements of Revenues, Expenses, and Changes in Net Position

<table>
<thead>
<tr>
<th></th>
<th>Year Ended June 30, 2017</th>
<th>Year Ended June 30, 2016</th>
<th>Amount of Change</th>
<th>Percentage Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premium receipts</td>
<td>$28,779,398</td>
<td>$30,360,162</td>
<td>$(1,580,764)</td>
<td>(5.21%)</td>
</tr>
<tr>
<td>Deferred compensation receipts</td>
<td>700,000</td>
<td>0</td>
<td>700,000</td>
<td>100.00%</td>
</tr>
<tr>
<td>Miscellaneous income</td>
<td>480,120</td>
<td>480,120</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td><strong>Total operating revenue</strong></td>
<td>29,959,518</td>
<td>30,840,282</td>
<td>$(880,764)</td>
<td>(2.86%)</td>
</tr>
<tr>
<td>Premium disbursements</td>
<td>28,769,588</td>
<td>30,328,802</td>
<td>(1,559,214)</td>
<td>(5.14%)</td>
</tr>
<tr>
<td>Premium refunds</td>
<td>9,810</td>
<td>31,360</td>
<td>(21,550)</td>
<td>(68.72%)</td>
</tr>
<tr>
<td>Administrative expenses</td>
<td>950,121</td>
<td>1,015,578</td>
<td>(65,457)</td>
<td>(6.45%)</td>
</tr>
<tr>
<td><strong>Total operating expenses</strong></td>
<td>29,729,519</td>
<td>31,375,740</td>
<td>(1,646,221)</td>
<td>(5.25%)</td>
</tr>
<tr>
<td>Net operating income (loss)</td>
<td>229,999</td>
<td>(535,458)</td>
<td>765,457</td>
<td>142.95%</td>
</tr>
<tr>
<td>Investment income</td>
<td>36,497</td>
<td>18,777</td>
<td>17,720</td>
<td>94.37%</td>
</tr>
<tr>
<td>Net revenues over (under) expenses</td>
<td>266,496</td>
<td>(516,681)</td>
<td>783,177</td>
<td>151.58%</td>
</tr>
<tr>
<td>Net position beginning of year</td>
<td>228,625</td>
<td>745,306</td>
<td>(516,681)</td>
<td>(69.32%)</td>
</tr>
<tr>
<td><strong>Net position end of year</strong></td>
<td>$495,121</td>
<td>$228,625</td>
<td>$266,496</td>
<td>116.56%</td>
</tr>
</tbody>
</table>

### Summary Comparative Statements of Cash Flows

<table>
<thead>
<tr>
<th></th>
<th>Year Ended June 30, 2017</th>
<th>Year Ended June 30, 2016</th>
<th>Amount of Change</th>
<th>Percentage Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash flows from operating activities</td>
<td>$330,265</td>
<td>$(566,218)</td>
<td>$896,483</td>
<td>158.33%</td>
</tr>
<tr>
<td>Cash flows from noncapital financing activities</td>
<td>(1,080)</td>
<td>1,596</td>
<td>(2,676)</td>
<td>(167.67%)</td>
</tr>
<tr>
<td>Cash flows from investing activities</td>
<td>(329,185)</td>
<td>564,622</td>
<td>(893,807)</td>
<td>(158.30%)</td>
</tr>
<tr>
<td><strong>Net change in cash</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash balances beginning of year</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Cash balances end of year</strong></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td></td>
</tr>
</tbody>
</table>
Financial Section

BASIC FINANCIAL STATEMENTS

Pension Trust Funds

Statements of Fiduciary Net Position | As of June 30, 2017

<table>
<thead>
<tr>
<th></th>
<th>MSEP</th>
<th>Judicial Plan</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash and short-term investments</td>
<td>$2,377,142,446</td>
<td>$40,812,604</td>
<td>$2,417,955,050</td>
</tr>
<tr>
<td><strong>Receivables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employer contributions</td>
<td>13,707,849</td>
<td>1,458,285</td>
<td>15,166,134</td>
</tr>
<tr>
<td>Investment sales</td>
<td>10,259,116</td>
<td>176,136</td>
<td>10,435,252</td>
</tr>
<tr>
<td>Investment income receivable</td>
<td>17,331,102</td>
<td>297,554</td>
<td>17,628,656</td>
</tr>
<tr>
<td>Other</td>
<td>264,294</td>
<td>4,538</td>
<td>268,832</td>
</tr>
<tr>
<td><strong>Total receivables</strong></td>
<td>41,562,361</td>
<td>1,936,513</td>
<td>43,498,874</td>
</tr>
<tr>
<td><strong>Investments at fair value</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. treasury securities</td>
<td>3,865,094,642</td>
<td>66,358,909</td>
<td>3,931,453,551</td>
</tr>
<tr>
<td>Government bonds &amp; gov’t. mortgage-backed securities</td>
<td>47,133,502</td>
<td>809,224</td>
<td>47,942,726</td>
</tr>
<tr>
<td>Corporate bonds</td>
<td>144,857</td>
<td>2,487</td>
<td>147,344</td>
</tr>
<tr>
<td>Convertible bonds</td>
<td>599,917</td>
<td>10,300</td>
<td>610,217</td>
</tr>
<tr>
<td>U.S. dollar-denominated international corporate bonds</td>
<td>1,181,054</td>
<td>20,277</td>
<td>1,201,331</td>
</tr>
<tr>
<td>Limited partnerships</td>
<td>3,747,256,147</td>
<td>64,335,767</td>
<td>3,811,591,914</td>
</tr>
<tr>
<td>Common stock</td>
<td>240,136,204</td>
<td>4,122,842</td>
<td>244,259,046</td>
</tr>
<tr>
<td>International equities</td>
<td>964,727,815</td>
<td>16,563,187</td>
<td>981,291,002</td>
</tr>
<tr>
<td>Foreign currency</td>
<td>83,838</td>
<td>1,439</td>
<td>85,277</td>
</tr>
<tr>
<td>Real estate investment trust</td>
<td>8,242</td>
<td>142</td>
<td>8,384</td>
</tr>
<tr>
<td><strong>Total investments</strong></td>
<td>8,866,366,218</td>
<td>152,224,574</td>
<td>9,018,590,792</td>
</tr>
<tr>
<td><strong>Capital assets</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land</td>
<td>262,774</td>
<td>4,512</td>
<td>267,286</td>
</tr>
<tr>
<td>Building and building improvements</td>
<td>4,171,561</td>
<td>71,621</td>
<td>4,243,182</td>
</tr>
<tr>
<td>Furniture, fixtures and equipment</td>
<td>1,273,082</td>
<td>21,857</td>
<td>1,294,939</td>
</tr>
<tr>
<td>Software</td>
<td>723,888</td>
<td>12,428</td>
<td>736,316</td>
</tr>
<tr>
<td><strong>Total capital assets</strong></td>
<td>6,431,305</td>
<td>110,418</td>
<td>6,541,723</td>
</tr>
<tr>
<td>Accumulated depreciation</td>
<td>(3,171,217)</td>
<td>(54,446)</td>
<td>(3,225,663)</td>
</tr>
<tr>
<td><strong>Net capital assets</strong></td>
<td>3,260,088</td>
<td>55,972</td>
<td>3,316,060</td>
</tr>
<tr>
<td>Prepaid expenses and other</td>
<td>104,123</td>
<td>1,788</td>
<td>105,911</td>
</tr>
<tr>
<td><strong>Total assets</strong></td>
<td>11,288,435,236</td>
<td>195,031,451</td>
<td>11,483,466,687</td>
</tr>
<tr>
<td><strong>Liabilities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administrative expenses payable</td>
<td>2,393,409</td>
<td>41,092</td>
<td>2,434,501</td>
</tr>
<tr>
<td>Investment purchases payable</td>
<td>9,994,120</td>
<td>171,587</td>
<td>10,165,707</td>
</tr>
<tr>
<td>Investment incentive fees payable</td>
<td>8,714,519</td>
<td>149,618</td>
<td>8,864,137</td>
</tr>
<tr>
<td>Employee vacation and overtime liability</td>
<td>596,425</td>
<td>10,240</td>
<td>606,665</td>
</tr>
<tr>
<td>Obligations under repurchase agreements</td>
<td>3,316,827,713</td>
<td>56,945,842</td>
<td>3,373,773,555</td>
</tr>
<tr>
<td>MOSERS investment portfolio liability (MIP)</td>
<td>4,550,752</td>
<td>78,131</td>
<td>4,628,883</td>
</tr>
<tr>
<td><strong>Total liabilities</strong></td>
<td>3,343,076,938</td>
<td>57,396,510</td>
<td>3,400,473,448</td>
</tr>
<tr>
<td><strong>Net position restricted for pensions</strong></td>
<td>$7,945,358,298</td>
<td>$137,634,941</td>
<td>$8,082,993,239</td>
</tr>
</tbody>
</table>

See accompanying Notes to the Financial Statements.
### Basic Financial Statements

**Pension Trust Funds**

**Statements of Changes in Fiduciary Net Position** | For Year Ended June 30, 2017

<table>
<thead>
<tr>
<th>Additions</th>
<th>MSEP</th>
<th>Judicial Plan</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contributions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employer contributions</td>
<td>$335,217,422</td>
<td>$34,246,826</td>
<td>$369,464,248</td>
</tr>
<tr>
<td>Employee contributions</td>
<td>25,439,343</td>
<td>786,745</td>
<td>26,226,088</td>
</tr>
<tr>
<td>Member purchases of service credit</td>
<td>1,691,046</td>
<td>0</td>
<td>1,691,046</td>
</tr>
<tr>
<td>Service transfer contributions</td>
<td>3,977,803</td>
<td>0</td>
<td>3,977,803</td>
</tr>
<tr>
<td><strong>Total contributions</strong></td>
<td>366,325,614</td>
<td>35,033,571</td>
<td>401,359,185</td>
</tr>
<tr>
<td><strong>Investment income</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>From investing activities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net appreciation in fair value of investments</td>
<td>329,824,090</td>
<td>5,662,673</td>
<td>335,486,763</td>
</tr>
<tr>
<td>Interest</td>
<td>36,893,888</td>
<td>633,423</td>
<td>37,527,311</td>
</tr>
<tr>
<td>Dividends</td>
<td>678,467</td>
<td>11,648</td>
<td>690,115</td>
</tr>
<tr>
<td>Other</td>
<td>42,557,190</td>
<td>730,654</td>
<td>43,287,844</td>
</tr>
<tr>
<td><strong>Total investing activity income</strong></td>
<td>409,953,635</td>
<td>7,038,398</td>
<td>416,992,033</td>
</tr>
<tr>
<td>Investing activity expenses:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management fees and incentives</td>
<td>(132,590,711)</td>
<td>(2,276,419)</td>
<td>(134,867,130)</td>
</tr>
<tr>
<td>Custody fees</td>
<td>(267,051)</td>
<td>(4,585)</td>
<td>(271,636)</td>
</tr>
<tr>
<td>Consultant fees</td>
<td>(786,292)</td>
<td>(13,500)</td>
<td>(799,792)</td>
</tr>
<tr>
<td>Performance measurement fees</td>
<td>(454,109)</td>
<td>(7,797)</td>
<td>(461,906)</td>
</tr>
<tr>
<td>Internal investment activity expenses</td>
<td>(3,803,355)</td>
<td>(65,299)</td>
<td>(3,868,654)</td>
</tr>
<tr>
<td><strong>Total investing activity expenses</strong></td>
<td>(137,901,518)</td>
<td>(2,367,600)</td>
<td>(140,269,118)</td>
</tr>
<tr>
<td><strong>Net income from investing activities</strong></td>
<td>272,052,117</td>
<td>4,670,798</td>
<td>276,722,915</td>
</tr>
<tr>
<td>From securities lending activities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Securities lending income</td>
<td>54,981</td>
<td>944</td>
<td>55,925</td>
</tr>
<tr>
<td>Securities lending expenses:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Borrower rebates</td>
<td>32,622</td>
<td>560</td>
<td>33,182</td>
</tr>
<tr>
<td>Management fees</td>
<td>(66,077)</td>
<td>(1,134)</td>
<td>(67,211)</td>
</tr>
<tr>
<td><strong>Total securities lending activities expenses</strong></td>
<td>(33,455)</td>
<td>(574)</td>
<td>(34,029)</td>
</tr>
<tr>
<td><strong>Net income from securities lending activities</strong></td>
<td>21,526</td>
<td>370</td>
<td>21,896</td>
</tr>
<tr>
<td><strong>Total net investment income</strong></td>
<td>272,073,643</td>
<td>4,671,168</td>
<td>276,744,811</td>
</tr>
<tr>
<td><strong>Miscellaneous income</strong></td>
<td>522,025</td>
<td>8,963</td>
<td>530,988</td>
</tr>
<tr>
<td><strong>Total additions</strong></td>
<td>638,921,282</td>
<td>39,713,702</td>
<td>678,634,984</td>
</tr>
<tr>
<td><strong>Deductions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benefits</td>
<td>700,281,256</td>
<td>33,979,837</td>
<td>734,261,093</td>
</tr>
<tr>
<td>BackDROP &amp; lump sum benefits</td>
<td>87,019,072</td>
<td>0</td>
<td>87,019,072</td>
</tr>
<tr>
<td>Service transfer payments</td>
<td>1,843,792</td>
<td>0</td>
<td>1,843,792</td>
</tr>
<tr>
<td>Contribution refunds</td>
<td>4,820,737</td>
<td>4,888</td>
<td>4,825,625</td>
</tr>
<tr>
<td>Administrative expenses</td>
<td>8,759,341</td>
<td>150,387</td>
<td>8,909,728</td>
</tr>
<tr>
<td><strong>Total deductions</strong></td>
<td>802,724,198</td>
<td>34,135,112</td>
<td>836,859,310</td>
</tr>
<tr>
<td><strong>Net (decrease) increase in net position</strong></td>
<td>(163,802,916)</td>
<td>5,578,590</td>
<td>(158,224,326)</td>
</tr>
<tr>
<td><strong>Net position restricted for pensions:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beginning of year</td>
<td>8,109,161,214</td>
<td>132,056,351</td>
<td>8,241,217,565</td>
</tr>
<tr>
<td>End of year</td>
<td>$7,945,358,298</td>
<td>$137,634,941</td>
<td>$8,082,993,239</td>
</tr>
</tbody>
</table>

See accompanying *Notes to the Financial Statements.*
Internal Service Funds

**Statements of Net Position** | As of June 30, 2017

<table>
<thead>
<tr>
<th></th>
<th>Life &amp; LTD</th>
<th>Deferred Compensation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Premiums receivable</td>
<td>$ 967,091</td>
<td>$ 0</td>
<td>$ 967,091</td>
</tr>
<tr>
<td>Investments at fair value</td>
<td>3,720,649</td>
<td>571,072</td>
<td>4,291,721</td>
</tr>
<tr>
<td>Capital assets</td>
<td>0</td>
<td>21,468</td>
<td>21,468</td>
</tr>
<tr>
<td>Accumulated depreciation — fixed assets</td>
<td>0</td>
<td>(9,870)</td>
<td>(9,870)</td>
</tr>
<tr>
<td>Leasehold improvements</td>
<td>0</td>
<td>3,880</td>
<td>3,880</td>
</tr>
<tr>
<td>Accumulated depreciation — leasehold</td>
<td>0</td>
<td>(2,910)</td>
<td>(2,910)</td>
</tr>
<tr>
<td><strong>Total assets</strong></td>
<td>$4,687,740</td>
<td>$583,640</td>
<td>$5,271,380</td>
</tr>
</tbody>
</table>

|                         |            |                        |          |
| **Liabilities and net position** |            |                        |          |
| **Liabilities**         |            |                        |          |
| Premiums payable        | $2,518,379 | $ 0                    | $2,518,379|
| Checks outstanding net of deposits | 2,114         | (1,069)               | 1,045    |
| Deferred revenue        | 2,103,956  |                        | 2,103,956|
| Other                   | 147,295    | 5,584                  | 152,879  |
| **Total liabilities**   | 4,771,744  | 4,515                  | 4,776,259|
| **Unrestricted net (deficit) position** | (84,004)        | 579,125               | 495,121  |
| **Total liabilities and net position** | $4,687,740 | $583,640               | $5,271,380|

See accompanying *Notes to the Financial Statements*.

Internal Service Funds

**Statements of Revenues, Expenses, and Changes in Net Position** | For Year Ended June 30, 2017

<table>
<thead>
<tr>
<th></th>
<th>Life &amp; LTD</th>
<th>Deferred Compensation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating revenues</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Premium receipts</td>
<td>$28,779,398</td>
<td>$ 0</td>
<td>$28,779,398</td>
</tr>
<tr>
<td>Deferred compensation receipts</td>
<td>0</td>
<td>700,000</td>
<td>700,000</td>
</tr>
<tr>
<td>Miscellaneous income</td>
<td>480,120</td>
<td>0</td>
<td>480,120</td>
</tr>
<tr>
<td><strong>Total operating revenues</strong></td>
<td>29,259,518</td>
<td>700,000</td>
<td>29,959,518</td>
</tr>
</tbody>
</table>

|                         |            |                        |          |
| **Operating expenses**  |            |                        |          |
| Premium disbursements   | 28,769,588 | 0                      | 28,769,588|
| Premium refunds         | 9,810      | 0                      | 9,810    |
| Administrative expenses | 532,169    | 417,952                | 950,121  |
| **Total operating expenses** | 29,311,567   | 417,952               | 29,729,519|
| **Operating revenues (under) over operating expenses** | (52,049)       | 282,048               | 229,999  |

|                         |            |                        |          |
| **Nonoperating revenues** |            |                        |          |
| Investment income       | 33,984     | 2,513                  | 36,497   |
| Net revenues (under) over expenses | (18,065)       | 284,561               | 266,496  |
| Net (deficit) position July 1, 2016 | (65,939)        | 294,564               | 228,625  |
| Net (deficit) position June 30, 2017 | $ (84,004)     | $ 579,125             | $ 495,121|

See accompanying *Notes to the Financial Statements*.
BASIC FINANCIAL STATEMENTS

Internal Service Funds

Statements of Cash Flows | Year Ended June 30, 2017

<table>
<thead>
<tr>
<th>Life &amp; LTD</th>
<th>Deferred Compensation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash flows from operating activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash received from employer and members</td>
<td>$ 29,253,874</td>
<td>$ 700,000</td>
</tr>
<tr>
<td>Payments to outside carriers</td>
<td>(28,698,184)</td>
<td>0</td>
</tr>
<tr>
<td>Refunds of premiums to members</td>
<td>(9,810)</td>
<td>0</td>
</tr>
<tr>
<td>Cash payments to employees for services</td>
<td>(272,091)</td>
<td>(244,286)</td>
</tr>
<tr>
<td>Cash payments to other suppliers of goods and services</td>
<td>(226,641)</td>
<td>(172,597)</td>
</tr>
<tr>
<td>Net cash provided by operating activities</td>
<td>47,148</td>
<td>283,117</td>
</tr>
</tbody>
</table>

Cash flows from noncapital financing activities

<table>
<thead>
<tr>
<th></th>
<th>Life &amp; LTD</th>
<th>Deferred Compensation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implicit funding of checks outstanding net of deposits</td>
<td>2,114</td>
<td>(1,069)</td>
<td>1,045</td>
</tr>
<tr>
<td>Implicit repayment of prior years checks outstanding net of deposits</td>
<td>(2,125)</td>
<td>0</td>
<td>(2,125)</td>
</tr>
<tr>
<td>Net cash (used) by noncapital financing activities</td>
<td>(11)</td>
<td>(1,069)</td>
<td>(1,080)</td>
</tr>
</tbody>
</table>

Cash flows from investing activities

<table>
<thead>
<tr>
<th></th>
<th>Life &amp; LTD</th>
<th>Deferred Compensation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase of investment securities</td>
<td>(1,140,457,675)</td>
<td>(571,072)</td>
<td>(1,141,028,747)</td>
</tr>
<tr>
<td>Proceeds from sale and maturities of investment securities</td>
<td>1,140,376,554</td>
<td>295,513</td>
<td>1,140,672,067</td>
</tr>
<tr>
<td>Cash received from investment income</td>
<td>33,984</td>
<td>2,513</td>
<td>36,497</td>
</tr>
<tr>
<td>Purchase of capital assets</td>
<td>0</td>
<td>(9,002)</td>
<td>(9,002)</td>
</tr>
<tr>
<td>Net cash (used) by investing activities</td>
<td>(47,137)</td>
<td>(282,048)</td>
<td>(329,185)</td>
</tr>
<tr>
<td>Net increase in cash</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cash balances June 30, 2016</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cash balances June 30, 2017</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
</tbody>
</table>

Reconciliation of operating revenues over operating expenses to net cash provided by operating activities

<table>
<thead>
<tr>
<th></th>
<th>Life &amp; LTD</th>
<th>Deferred Compensation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating revenues (under) over operating expenses</td>
<td>$ (52,049)</td>
<td>$ 282,048</td>
<td>$ 229,999</td>
</tr>
</tbody>
</table>

Adjustments to reconcile operating revenues over operating expenses to net cash provided by operating activities

<table>
<thead>
<tr>
<th></th>
<th>Life &amp; LTD</th>
<th>Deferred Compensation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depreciation expense</td>
<td>0</td>
<td>2,320</td>
<td>2,320</td>
</tr>
<tr>
<td>Change in assets and liabilities:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase (decrease) in operational accounts receivable</td>
<td>(5,085)</td>
<td>0</td>
<td>(5,085)</td>
</tr>
<tr>
<td>Increase (decrease) in operational liabilities</td>
<td>104,282</td>
<td>(1,251)</td>
<td>103,031</td>
</tr>
<tr>
<td>Total adjustments</td>
<td>99,197</td>
<td>1,069</td>
<td>100,266</td>
</tr>
<tr>
<td>Net cash provided by operating activities</td>
<td>$ 47,148</td>
<td>$ 283,117</td>
<td>$ 330,265</td>
</tr>
</tbody>
</table>

See accompanying Notes to the Financial Statements.
Notes to the Financial Statements | Year Ended June 30, 2017

(1) Plan Descriptions and Contribution Information

Missouri State Employees’ Plan (MSEP)
The MSEP is a cost-sharing multiple-employer, defined-benefit public employee retirement plan with two benefit structures known as the MSEP (closed plan) and MSEP 2000 (which includes the MSEP 2011 tier), which are administered by the Missouri State Employees’ Retirement System (MOSERS) in accordance with Sections 104.010 and 104.312 to 104.1215 of the Revised Statutes of Missouri (RSMo). As established under Section 104.320, RSMo, MOSERS is a body corporate and an instrumentality of the state. In the system are vested the powers and duties specified in Sections 104.010 and 104.312 to 104.1215, RSMo and such other powers as may be necessary or proper to enable it, its officers, employees, and agents to carry out fully and effectively all the purposes of Sections 104.010 and 104.312 to 104.1215, RSMo.

Responsibility for the operation and administration of the system is vested in the 11-member MOSERS Board of Trustees as defined by state law. Due to the nature of MOSERS’ reliance on funding from the state of Missouri and the overall control of the plan document by the legislative and executive branches of state government, the MSEP is considered a component unit of the state of Missouri financial reporting entity and is included in the state’s financial reports as a pension trust fund.

The board intends to follow a financing pattern which computes and requires contribution amounts which, expressed as a percent of active member payroll, will remain approximately level from year-to-year and from one generation of citizens to the next generation. For the year ended June 30, 2017, the employer contribution rate was 16.97% of covered payroll.

Complete recognition of the year-to-year swings in the fair value of system assets would produce contribution rate changes that would run counter to the “approximately level” goal. A common actuarial practice, referred to as asset smoothing, is used to address that issue. As a result of smoothing, investment gains or losses, relative to what would have been earned at the assumed rate on the actuarial value of assets, were added to any previously unrecognized gains or losses and one-fifth of that total amount was recognized in the June 30, 2017 valuation, with four-fifths deferred for future recognition. In no event may the actuarial value of assets as of the valuation date be more than 125% or less than 80% of the fair value of assets on that date.

The 2017 actuarial valuation used the nominal investment return assumption of 7.50% and wage inflation and price inflation of 3% and 2.5%, respectively, to value plan liabilities. See the Actuarial Section for all actuarial assumptions used.

At any point in time, the ratio of actuarial to fair value of assets will be more or less than the fair value but, if the smoothing method is prudent and properly constructed, those values will converge over time. As of June 30, 2017 and 2016, the ratio of actuarial to fair value of assets was 112% and 109%, respectively, for the MSEP.

Generally, all full-time state employees, employed before July 2000 who became vested and were not covered under another state-sponsored retirement plan, are eligible for membership in the MSEP (closed plan). Full-time state employees who were employed after July 1, 2000 but before January 1, 2011, are members in the MSEP 2000. Those first-employed in a benefit-eligible position on or after January 1, 2011 are members of the MSEP 2011 tier of the MSEP 2000. MOSERS participates as an employer in the MSEP and MSEP 2000. The MSEP provides defined-benefit pension, survivor, life insurance, and long-term disability benefits.

As of the June 30, 2017 valuation, membership* in the MSEP consisted of the following:

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retirees and beneficiaries currently receiving benefits</td>
<td>46,560</td>
</tr>
<tr>
<td>Terminated employees entitled to, but not yet receiving benefits</td>
<td>19,578</td>
</tr>
<tr>
<td>Active</td>
<td></td>
</tr>
<tr>
<td>Vested</td>
<td>28,840</td>
</tr>
<tr>
<td>Nonvested</td>
<td>20,070</td>
</tr>
<tr>
<td>Total membership</td>
<td>48,910</td>
</tr>
</tbody>
</table>

* Excludes 178 members on leave of absence and 849 members on long-term disability.
Contributions for MSEP (closed plan), MSEP 2000, and the MSEP 2011 tier are determined through annual actuarial valuations. Employer contributions for FY17 were 16.97% of covered payroll, which is the rate set as a minimum policy employer contribution determined by the June 30, 2013, actuarial valuation until the actuarial funding ratio of the MOSERS plan is at least 80%. Administration of the MSEP is financed through contributions to this plan from the state of Missouri and its component employers and investment earnings.

Prior to September 1, 1972, contributions by members were required. Accumulated employee contributions made prior to that time, plus interest through August 28, 1997, are refundable to the member or designated beneficiaries upon request.

**MSEP (closed plan)**

General state employees are fully vested for benefits upon accruing 5 years of credited service. Under the MSEP, general employees may retire with full benefits upon the earliest of attaining:

- Age 65 with 5 years of service;
- Age 60 with 15 years of service; or
- Age 48 with age and service equaling 80 or more – “Rule of 80.”

General employees may retire early at age 55 with at least 10 years of service with reduced benefits. The base benefit in the general employee plan is equal to 1.6% multiplied by the final average pay multiplied by years of credited service.

Members hired prior to August 28, 1997 receive cost-of-living adjustments (COLAs) annually based on 80% of the percentage increase in the average consumer price index (CPI) from one year to the next, with a minimum rate of 4% and maximum rate of 5% until the cumulative amount of COLAs equals 65% of the original benefit. Thereafter, the 4% minimum rate is eliminated. Members hired on or after August 28, 1997, and members who have met their COLA cap, receive COLAs annually based on 80% of the percentage increase in the average CPI from one year to the next, up to a maximum rate of 5%.

Qualified, terminated-vested members may make a one-time election to receive the present value of their future benefit in a lump-sum payment rather than a monthly benefit at retirement age. To qualify, they must have left state employment on or after October 1, 1984 and prior to September 1, 2002, have less than 10 years of service, not be within five years of retirement eligibility, meet age requirements, and have a benefit present value of less than $10,000.

There are no employee (member) contributions to the MSEP.

**MSEP 2000**

General state employees are fully vested for benefits upon accruing 5 years of credited service. Under the MSEP 2000, general employees may retire with full benefits upon the earliest of attaining:

- Age 62 with 5 years of service; or
- Age 48 with age and service equaling 80 or more – “Rule of 80.”

General employees may retire early at age 57 with at least 5 years of service with reduced benefits. The base benefit in the general employee plan is equal to 1.7% multiplied by the final average pay multiplied by years of credited service.

Those retiring under “Rule of 80” receive an additional temporary benefit equivalent to 0.8% multiplied by the final average pay multiplied by years of credited service which is payable until age 62.

COLAs are provided annually based on 80% of the percentage increase in the average CPI from one year to the next, up to a maximum rate of 5%.

There are no employee (member) contributions to the MSEP 2000.

**MSEP 2011 Tier**

On July 19, 2010, an additional tier of the MSEP 2000 defined-benefit pension plan was signed into law for members of MOSERS. This tier (MSEP 2011) includes all members first employed in a benefit-eligible position on or after January 1, 2011.

Currently, general state employees in the MSEP 2011 Tier are fully vested for benefits upon accruing 10 years of credited service. The vesting requirement will change to 5 years for members employed on or after January 1, 2018.
Under the MSEP 2011, general employees may retire with full benefits upon the earliest of attaining:

- Age 67 with 10 years of service; or
- Age 55 with age and service equaling 90 or more – “Rule of 90.”

General employees may retire early at age 62 with at least 10 years of service with reduced benefits. The base benefit in the general employee plan is equal to 1.7% multiplied by final average pay multiplied by years of credited service.

Those retiring under “Rule of 90” receive an additional temporary benefit equivalent to 0.8% multiplied by final average pay multiplied by years of credited service, which is payable until age 62.

COLAs are provided annually based on 80% of the percentage increase in the average CPI from one year to the next, up to a maximum rate of 5%.

Employees (members) are required to contribute 4% of pay to the MSEP 2011.

For a summary of benefits for general employees, legislators, and elected officials under the MSEP, MSEP 2000, and MSEP 2011 tier, refer to the Summary of Plan Provisions in the Actuarial Section of this report.

Judicial Plan

The Judicial Plan is a single-employer, public employee retirement plan administered in accordance with Sections 476.445 to 476.690, RSMo. Responsibility for the operation and administration of the Judicial Plan is vested in the MOSERS Board of Trustees. Due to the nature of MOSERS’ reliance on funding from the state of Missouri and the overall control of the plan document by the legislative and executive branches of state government, the Judicial Plan is considered a component unit of the state of Missouri financial reporting entity and is included in the state’s financial reports as a pension trust fund.

The 2017 actuarial valuation of the Judicial Plan use the nominal investment return assumption of 7.50% and wage inflation and price inflation of 3% and 2.5%, respectively. See the Actuarial Section for all actuarial assumptions used.

Judges and commissioners of the supreme court or the court of appeals, judges of the circuit court, probate court, magistrate court, court of common pleas, court of criminal corrections, justices of the peace, commissioners or deputy commissioners of the circuit court appointed after February 29, 1972, commissioners of the juvenile division of the circuit court appointed pursuant to Section 211.023, RSMo, commissioners of the drug court pursuant to Section 478.466, RSMo, or commissioners of the family court are eligible for membership in the Judicial Plan. The Judicial Plan provides defined-benefit pension, survivor, life insurance, and disability benefits. Members are immediately vested.

Funding of the Judicial Plan on an actuarial basis began on July 1, 1998. Contributions are determined through annual actuarial valuations. Employer contributions for FY17 were 58.45% of covered payroll, which is the rate set as a minimum policy employer contribution determined by the June 30, 2013, actuarial valuation until the actuarial funding ratio of the Judicial Plan is at least 80%. The state of Missouri makes the employer contribution to the Judicial Plan. Administration of the Judicial Plan is financed through contributions to this plan from the state of Missouri and investment earnings.

As of the June 30, 2017 valuation, membership* in the Judicial Plan consisted of the following:

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retirees and beneficiaries currently receiving benefits</td>
<td>559</td>
</tr>
<tr>
<td>Terminated employees entitled to, but not yet receiving benefits</td>
<td>25</td>
</tr>
<tr>
<td>Active</td>
<td></td>
</tr>
<tr>
<td>Vested</td>
<td>410</td>
</tr>
<tr>
<td>Nonvested</td>
<td>0</td>
</tr>
<tr>
<td>Total membership</td>
<td>994</td>
</tr>
</tbody>
</table>

* Excludes 1 member on long-term disability.

Judicial Plan (closed plan)

Members of the Judicial Plan may retire with full benefits upon the earliest of attaining:

- Age 62 with 12 years of service;
- Age 60 with 15 years of service; or
- Age 55 with 20 years of service.
Employees may retire early at age 62 with less than 12 years of service or age 60 with less than 15 years of service with a reduced benefit that is based upon years of service relative to 12 or 15 years.

In the Judicial Plan, the base benefit for members with 12 or more years of service is equivalent to 50% of compensation on the highest court served.

Members hired prior to August 28, 1997 receive COLAs annually based on 80% of the percentage increase in the average CPI from one year to the next, with a minimum rate of 4% and a maximum rate of 5% until the cumulative amount of COLAs equals 65% of the original benefit. Thereafter, the 4% minimum rate is eliminated. Members hired on or after August 28, 1997, and members who have met their COLA cap, receive COLAs annually based on 80% of the percentage increase in the average CPI from one year to the next, up to a maximum rate of 5%.

Qualified, terminated-vested members may make a one-time election to receive the present value of their future benefit in a lump-sum payment rather than a monthly benefit at retirement age. To qualify, they must have left state employment on or after October 1, 1984 and prior to September 1, 2002, have less than 10 years of service, not be within five years of retirement eligibility, meet age requirements, and have a benefit present value of less than $10,000.

**Judicial Plan 2011 Tier**

On July 19, 2010, an additional tier of the defined-benefit Judicial Plan was signed into law. This tier (Judicial Plan 2011) includes all new judicial members first serving in a benefit-eligible position on or after January 1, 2011.

Under the Judicial Plan 2011, members may retire with full benefits upon the earliest of attaining:

- Age 67 with 12 years of service; or
- Age 62 with 20 years of service; or

Judicial members may retire early at age 67 with less than 12 years of service with reduced benefits, or age 62 with less than 20 years of service with a reduced benefit based on years of service.

For a more detailed summary of benefits for members of the Judicial Plan, refer to the Summary of Plan Provisions in the Actuarial Section of this report.

**Missouri State Insured Defined-Benefit Insurance Plan**

The Missouri State Insured Defined-Benefit Insurance Plan is accounted for as an internal service fund of the state of Missouri and is administered through The Standard, which is a third-party administrator with oversight by MOSERS. It provides basic life insurance in an amount equal to one times annual salary while actively employed (with a $15,000 minimum) to eligible members of the MSEP, MSEP 2000 (except employees of the Missouri Department of Conservation and certain state colleges and universities), MSEP 2011, Judicial Plan, Judicial Plan 2011, and certain members of the Public School Retirement System.

The plan also provides duty-related death benefits, optional life insurance for active employees and retirees who are eligible for basic coverage, and a long-term disability insurance plan for eligible members. For a more detailed description of insurance benefits, refer to page 119-120 on the Actuarial Section of this report.

Due to the nature of MOSERS’ reliance on funding from the state of Missouri and its component employers, and the overall control of the plan document by the legislative and executive branches of state government, the Missouri State Insured Defined-Benefit Insurance Plan is considered a component unit of the state of Missouri financial reporting entity and is included in the state’s financial reports as an internal service fund. Administration of the Missouri State Insured Defined-Benefit Insurance Plan is financed through contributions from the state of Missouri and its component employers.

**State of Missouri Deferred Compensation Plan (MO Deferred Comp)**

MO Deferred Comp is a retirement savings plan for state of Missouri employees, including faculty and staff at 10 state universities. Money invested in the plan provides income in retirement to supplement the member's defined-benefit pension and Social Security benefits. Funds are automatically deducted from the employee’s pay and placed in their account. The saver decides how the money will be invested. Employees may also roll over eligible pre-tax distributions from other qualified retirement plans.

The State of Missouri Deferred Compensation Plan is accounted for as an internal service fund. MOSERS uses ICMA-RC as an external provider for record keeping. Total plan assets as of June 30, 2017 were $2,034,459,365.
Record keeping of individual accounts and management of investment options are paid from charges to the participants and investment option asset-based fee reimbursement arrangements. Participants in the plan manage individual accounts by choosing investment options from the available fund lineup. MOSERS’ role is to oversee the plan, choose external providers and investment options, and develop communications to plan participants. In FY17, a total of $2,811,397 was collected from a combination of $1,828,269 in investment option asset-based fee reimbursements and $983,128 in participant fees.

Effective July 1, 2012, new permanent full-time and part-time employees are automatically enrolled at 1% of pay into the State of Missouri Deferred Compensation Plan. As of June 30, 2017, 14,629 currently active employees have been automatically enrolled in the plan since inception. There are 13,194 employees who continue to contribute to the plan, making the opt-out rate 9.8%.

Audited financial statements for the State of Missouri Deferred Compensation Plan can be viewed online at www.modederredcomp.org.

(2) Summary of Significant Accounting Policies and Plan Asset Matters

Basis of Accounting
The financial statements of the MSEP, the Judicial Plan, the Missouri State Insured Defined-Benefit Insurance Plan, and the State of Missouri Deferred Compensation Plan were prepared using the accrual basis of accounting. The accompanying financial statements are prepared in accordance with accounting principles generally accepted in the U.S. that apply to governmental accounting.

Contributions are recognized as revenues when due, pursuant to statutory requirements. Benefits and refunds are recognized when due and payable and expenses are recorded when the corresponding liabilities are incurred regardless of when contributions are received or payment is made. The direct method of reporting cash flows is used.

Estimates
The preparation of financial statements in conformity with accounting principles generally accepted in the U.S. requires management to make estimates and assumptions that affect the accompanying financial statements and disclosures. Actual results could differ from those estimates.

Method Used to Value Investments
Section 104.440, RSMo allows the board of trustees to invest the trust fund assets in accordance with the prudent person rule. Investments of the pension trust funds and the internal service funds are reported on the basis of fair value. MOSERS unitizes investments for the purpose of allowing participants in the State of Missouri Deferred Compensation Plan the option to invest in the MOSERS investment portfolio (MIP). For financial reporting purposes, investments throughout this CAFR are reported in whole and include 0.06%, or $4,628,883, of the units invested in the MIP by Deferred Compensation participants. The schedule on page 46 provides a summary of the fair value of the investments as reported on the Statements of Fiduciary Net Position of the pension trust funds and Statements of Net Position of the internal service funds.

Disclosures regarding fair value measurements, the level of fair value hierarchy, and valuation techniques can be found in note (3) Cash and Investments on pages 36-37.

Fair values for the equity real estate investments are based on appraisals. Fair values of the limited partnership investments are based on valuations of the underlying companies of the limited partnerships as reported by the general partner. Certain limited partnerships reflect values and related performance on a quarter lag basis due to the nature of those investments and the time it takes to value them. Fair value of the commingled funds is determined based on the underlying asset values. The remaining assets are primarily valued by the system’s master custodian, BNY Mellon, using the last trade price information supplied by various pricing data vendors.

Capital Assets
The MOSERS building and other capital assets are stated at cost less accumulated depreciation.
(3) Cash and Investments

Cash

Custodial credit risk for cash deposits and investments is the risk that, in the event of a bank failure, the system and plan deposits may not be returned. The board adopted the following policy on June 18, 2009:

The executive director shall require that banks managing demand deposit accounts for any retirement plan associated with MOSERS (MOSERS’ defined-benefit plan and the deferred compensation plan/state incentive compensation plan) to hold, at minimum, collateral security in either MOSERS’ name or the State of Missouri Deferred Compensation Plan and in an amount equal to, or more than, the amount on deposit that exceeds the Federal Deposit Insurance Corporation (FDIC) insured amount. The types of collateral security shall be included on a list maintained by the State Treasurer’s office in accordance with Section 30.270 RSMo, but in no case may a bank pledge collateral that does not specifically allow MOSERS to release the collateral or pledge collateral that represents securities of the pledging banks.

Cash balances represent both demand deposit accounts held at the bank and investment cash on deposit with the investment custodian. To maximize investment income, the float caused by outstanding checks is invested in an internally managed short-term investment account, thus causing a possible negative book balance. Negative book balances are reflected in the liabilities’ section of the Statements of Net Position of the internal service funds and included in the cash and short-term investments on the Statements of Fiduciary Net Position of the pension trust funds.

The table below is a schedule of the aggregate book and bank balances of all cash accounts.

Aggregate Book and Bank Balances

<table>
<thead>
<tr>
<th>Cash Balances</th>
<th>Book</th>
<th>Bank/Investment Custodian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pension trust funds – investment custodian</td>
<td>$(722,484)</td>
<td>$(722,484)</td>
</tr>
<tr>
<td>Pension trust funds – demand deposits</td>
<td>(10,666,646)</td>
<td>250,107</td>
</tr>
<tr>
<td>Internal service fund – insurance and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>deferred compensation plan demand deposits</td>
<td>(1,045)</td>
<td>161</td>
</tr>
</tbody>
</table>

Under the repurchase agreement, the bank does not have the right to substitute other appropriate securities. Central Trust Bank pledged the following securities to MOSERS on June 30, 2017, as collateral for overnight repurchase agreements:

Collateral for Overnight Repurchase Agreements

<table>
<thead>
<tr>
<th></th>
<th>Maturity</th>
<th>Pledged</th>
<th>Fair Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Farm Credit Bank</td>
<td>03/29/2018</td>
<td>$3,000,000</td>
<td>$2,994,240</td>
</tr>
<tr>
<td>Small Business Association Pool</td>
<td>12/25/2036</td>
<td>1,500,000</td>
<td>1,633,710</td>
</tr>
<tr>
<td>Small Business Association Pool</td>
<td>10/25/2027</td>
<td>3,000,000</td>
<td>3,265,430</td>
</tr>
<tr>
<td>Small Business Association Pool</td>
<td>08/25/2037</td>
<td>5,000,000</td>
<td>5,439,063</td>
</tr>
<tr>
<td>Small Business Association Pool</td>
<td>04/25/2035</td>
<td>2,300,000</td>
<td>2,472,590</td>
</tr>
</tbody>
</table>
Investments

Investment Policy

In 2015, MOSERS completed a transition to a portfolio that shifted from a return-driven process to a risk-driven process using an allocation approach that focuses on fundamental economic factors such as growth and inflation as well as other factors with expected return values such as credit, carry, and illiquidity. In July 2016, the board voted to adjust the policy portfolio slightly but still maintain the risk-driven approach to asset allocation.

MOSERS’ policy, with respect to the allocation of invested assets, is established and may be amended by the board of trustees majority vote. The board’s guiding principles with respect to the investment of MOSERS’ assets are to preserve the long-term corpus of the fund, maximize total return within prudent risk parameters, and act in the exclusive interest of the members of the system. The board has developed a risk-weighted policy allocation that is designed to achieve the long-term required return objectives of the system, given certain risk constraints. The current asset allocation reflects a diversified portfolio, which will perform well in a variety of economic conditions and will help reduce the portfolio’s overall volatility.

The board has authorized staff to create and maintain an internally managed beta-balanced portfolio that utilizes a modest amount of leverage in order to balance the risk allocations equally across the five asset classes contained in that portfolio. The leverage is limited to 0.83 times of beta-balanced capital. The limit may also be stated as 183% of beta-balanced capital. The table below illustrates the fair value, market exposure, and policy exposure of the internally managed beta-balanced portfolio by asset class as of June 30, 2017.

### Schedule of Internally Managed Leverage

<table>
<thead>
<tr>
<th>Internal Beta-Balanced Portfolio</th>
<th>Fair Value of Internally Managed Beta-Balanced Capital</th>
<th>Percent of Investments at Fair Value</th>
<th>Market Exposure</th>
<th>Percent of Investments at Market Exposure</th>
<th>Policy Exposure Beta-Balanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opportunistic global equities</td>
<td>$2,717,429,664</td>
<td>38.2%</td>
<td>$2,601,563,280</td>
<td>36.6%</td>
<td>38%</td>
</tr>
<tr>
<td>Nominal bonds</td>
<td>747,798,836</td>
<td>10.5</td>
<td>2,840,437,911</td>
<td>39.9</td>
<td>44</td>
</tr>
<tr>
<td>Commodities</td>
<td>313,169,917</td>
<td>4.4</td>
<td>1,144,649,079</td>
<td>16.1</td>
<td>20</td>
</tr>
<tr>
<td>Inflation-linked bonds</td>
<td>912,475,569</td>
<td>12.8</td>
<td>2,673,386,121</td>
<td>37.6</td>
<td>39</td>
</tr>
<tr>
<td>Alternative beta</td>
<td>2,170,513,175</td>
<td>30.5</td>
<td>2,060,111,457</td>
<td>28.9</td>
<td>31</td>
</tr>
<tr>
<td>Excess cash</td>
<td>255,616,205</td>
<td>3.6</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>Total internal beta-balanced portfolio</td>
<td>$7,117,003,366</td>
<td>100.0%</td>
<td>$11,320,147,848</td>
<td>159.1%</td>
<td>172%</td>
</tr>
</tbody>
</table>

The long-term expected rate of return on pension plan investments was determined using a building-block method in which best-estimate rates of expected future real rates of return (expected returns, net of pension plan investment expense 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 geometric real rates of return for each major asset class included in MOSERS’ target asset allocation as of June 30, 2017, are summarized in the table below.

### Target Asset Allocation

<table>
<thead>
<tr>
<th></th>
<th>Policy Allocation</th>
<th>Long-Term Expected Real Rate of Return*</th>
<th>Weighted Average Long-Term Expected Real Rate of Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opportunistic global equities</td>
<td>38.0%</td>
<td>5.5%</td>
<td>2.1%</td>
</tr>
<tr>
<td>Nominal bonds</td>
<td>44.0</td>
<td>1.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Commodities</td>
<td>20.0</td>
<td>4.5</td>
<td>0.9</td>
</tr>
<tr>
<td>Inflation-linked bonds</td>
<td>39.0</td>
<td>0.8</td>
<td>0.3</td>
</tr>
<tr>
<td>Alternative beta</td>
<td>31.0</td>
<td>4.5</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>172.0%</td>
<td></td>
<td>5.2%</td>
</tr>
</tbody>
</table>

* Represents best estimates of geometric rates of return for each major asset class included.
Concentration of Credit Risk
Concentration of credit risk is the risk of loss attributed to the magnitude of an investment in a single-issuer. Issuer concentration limits are established in individual portfolio guidelines that generally do not allow a single issuer to be greater than 5% of the portfolio’s fair value. As of fiscal year end, there is no single issuer exposure, exclusive of investments issued or explicitly guaranteed by the U.S. government, within MOSERS’ portfolio that comprises 5% or more of the overall portfolio or MOSERS’ fiduciary net position. Therefore, there is no concentration of credit risk to report.

Money-Weighted Rate of Return
The annual money-weighted rate of return on pension plan investments, net of pension plan investment expense, was 3.51% for the year ended June 30, 2017. The money-weighted rate of return expresses investment performance, net of investment expense, adjusted for changing amounts actually invested.

Fair Value Measurement
MOSERS categorizes its fair value measurements within the fair value hierarchy established by generally accepted accounting principles. The hierarchy is based on the valuation inputs used to measure the fair value of the asset and give the highest priority to unadjusted quoted prices in active markets for identical assets or liabilities (level 1 measurements) and the lowest priority to unobservable inputs (level 3 measurements).

- **Level 1** – Unadjusted quoted prices for identical instruments in active markets.
- **Level 2** – Quoted prices for similar instruments in active markets; quoted prices for identical or similar instruments in markets that are not active; and model-derived valuations in which all significant inputs are observable.
- **Level 3** – Valuations derived from valuation techniques in which significant inputs are unobservable.

Investments that are measured at fair value using the net asset value per share (or its equivalent) as a practical expedient are not classified in the fair value hierarchy.

The categorization of investments within the hierarchy is based upon the pricing transparency of the instrument and should not be perceived as the particular investment’s risk.

In instances where inputs used to measure fair value fall into different levels in the fair value hierarchy, fair value measurements in their entirety are categorized based on the lowest level input that is significant to the valuation. MOSERS’ assessment of the significance of particular inputs to these fair value measurements requires judgment and considers factors specific to each asset or liability. The table on pages 36 shows the fair value leveling of the investments.

Debt, equities, and investment derivatives classified in level 1 of the fair value hierarchy are valued using prices quoted in active markets for those securities.

Debt securities and liabilities classified in level 2 have nonproprietary information readily available to market participants from multiple independent sources, which are known to be actively involved in the market. Pricing inputs may include market quotations, yields, maturities, call features and ratings. Derivative securities classified in level 2 are securities whose values are derived daily from associated traded securities.

Private equity securities classified in level 2 are valued at the price observed in subsequent market activity.
Investments and Derivative Instruments Measured at Fair Value

<table>
<thead>
<tr>
<th>Investments by fair value level</th>
<th>Total</th>
<th>Quoted Prices in Active Markets for Identical Assets (Level 1)</th>
<th>Significant Other Observable Inputs (Level 2)</th>
<th>Significant Unobservable Inputs (Level 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equity securities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. common and preferred stock</td>
<td>$ 70,003,639</td>
<td>$ 69,997,589</td>
<td>0</td>
<td>$6,050</td>
</tr>
<tr>
<td>Foreign stocks</td>
<td>1,344,572</td>
<td>1,344,572</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total equity securities</td>
<td>71,348,211</td>
<td>71,342,161</td>
<td>0</td>
<td>6,050</td>
</tr>
<tr>
<td>Debt securities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. short-term funds</td>
<td>717,520,000</td>
<td>717,520,000</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Repurchase agreements</td>
<td>1,100,000,000</td>
<td>0</td>
<td>1,100,000,000</td>
<td>0</td>
</tr>
<tr>
<td>U.S. agency obligations</td>
<td>325,672,097</td>
<td>0</td>
<td>325,672,097</td>
<td>0</td>
</tr>
<tr>
<td>Foreign debt securities</td>
<td>49,144,056</td>
<td>0</td>
<td>49,144,056</td>
<td>0</td>
</tr>
<tr>
<td>U.S. corporate bonds</td>
<td>147,344</td>
<td>0</td>
<td>147,344</td>
<td>0</td>
</tr>
<tr>
<td>U.S. government</td>
<td>4,206,522,308</td>
<td>4,206,522,308</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total debt securities</td>
<td>6,399,005,805</td>
<td>4,924,042,308</td>
<td>1,474,963,497</td>
<td>0</td>
</tr>
<tr>
<td>Total investment assets</td>
<td>6,470,354,016</td>
<td>4,995,384,469</td>
<td>1,474,963,497</td>
<td>6,050</td>
</tr>
<tr>
<td><strong>Liabilities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reverse repurchase agreements</td>
<td>(3,373,773,555)</td>
<td>0</td>
<td>(3,373,773,555)</td>
<td>0</td>
</tr>
<tr>
<td>Total net investment assets by fair value level</td>
<td>3,096,580,461</td>
<td>4,995,384,469</td>
<td>(1,898,810,058)</td>
<td>6,050</td>
</tr>
<tr>
<td><strong>Investment derivative instruments</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Futures contracts</td>
<td>21,913,499</td>
<td>21,913,499</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Foreign exchange forward contracts</td>
<td>80,225</td>
<td>80,225</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Swap market value</td>
<td>(3,925,002)</td>
<td>0</td>
<td>(3,925,002)</td>
<td>0</td>
</tr>
<tr>
<td>Total investment derivative instruments</td>
<td>18,068,722</td>
<td>21,993,724</td>
<td>(3,925,002)</td>
<td>0</td>
</tr>
<tr>
<td><strong>Investments measured at the net asset value (NAV)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commingled international equity funds</td>
<td>1,206,804,849</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hedge funds</td>
<td>2,664,508,353</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private equity funds</td>
<td>760,772,033</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private real estate funds</td>
<td>118,183,607</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private timber funds</td>
<td>216,143,510</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total investments measured at NAV</td>
<td>4,966,412,352</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Other Investments</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash and receivables/payables</td>
<td>(10,593,016)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total fund value</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Reconciliation to Statement of Fiduciary Net Position

| Total portfolio value          | $ 8,070,468,519 |
| Reverse repurchase agreements  | 3,373,773,555   |
| STIF (2,418,765,451)            |                 |
| Uninvested cash                | 722,484         |
| Interest and dividends receivable | 5,469,068     |
| Variation margin               | (12,184,564)    |
| Accounts receivable securities sold | (10,435,252)  |
| Accounts payable securities purchased | 10,165,707   |
| Fees payable                   | 10,314,862      |
| Investments per Statement of Fiduciary Net Position | $ 9,018,590,792 |
### Investments Measured at the Net Asset Value

<table>
<thead>
<tr>
<th>Description</th>
<th>June 30, 2017</th>
<th>Unfunded Commitments</th>
<th>Redemption Frequency</th>
<th>Redemption Notice Period</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Active hedge funds</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long/short equity hedge funds</td>
<td>224,623,297</td>
<td></td>
<td>Quarterly, Semi-Annually, Annually</td>
<td>30-60</td>
</tr>
<tr>
<td>Merger arbitrage hedge funds</td>
<td>115,091,118</td>
<td></td>
<td>Monthly</td>
<td>45</td>
</tr>
<tr>
<td>Multi-strategy hedge funds</td>
<td>62,747,524</td>
<td></td>
<td>Quarterly</td>
<td>65</td>
</tr>
<tr>
<td>Equity market neutral hedge funds</td>
<td>99,796,938</td>
<td></td>
<td>Quarterly</td>
<td>90</td>
</tr>
<tr>
<td>Event driven hedge funds</td>
<td>218,867,279</td>
<td></td>
<td>Quarterly</td>
<td>60-65</td>
</tr>
<tr>
<td>Macro hedge funds</td>
<td>223,258,439</td>
<td></td>
<td>Monthly, Quarterly</td>
<td>30</td>
</tr>
<tr>
<td>Risk premia hedge funds</td>
<td>408,424,347</td>
<td></td>
<td>Bi-Weekly, Monthly</td>
<td>15-30</td>
</tr>
<tr>
<td>Risk parity hedge funds</td>
<td>867,275,340</td>
<td></td>
<td>Monthly</td>
<td>5-15</td>
</tr>
<tr>
<td>Fund-of-funds</td>
<td>240,743,966</td>
<td></td>
<td>Monthly</td>
<td>95</td>
</tr>
<tr>
<td><strong>Pending liquidated hedge funds</strong></td>
<td>760,772,033</td>
<td>$307,845,477</td>
<td>€868,751</td>
<td></td>
</tr>
<tr>
<td><strong>Private equity funds</strong></td>
<td>118,183,607</td>
<td>19,099,354</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Private real estate funds</strong></td>
<td>216,143,510</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Total investments measured at NAV</strong></td>
<td>$4,966,412,352</td>
<td>$326,944,831</td>
<td>€868,751</td>
<td></td>
</tr>
</tbody>
</table>

1. **Commingled international equity funds** – Three international equity funds are considered to be commingled in nature. Each are valued at the net asset value held at the end of the period based on the fair value of the underlying investments.

2. **Long/short equity hedge funds** – Consisting of three funds, this strategy invests both long and short in U.S. and global equity securities, with a goal of adding growth and minimizing market exposure. These investments are valued at NAV. Due to contractual lock-up restrictions, these investments remain restricted from 4 to 18 months.

3. **Merger arbitrage hedge fund** – Consisting of one fund, this strategy invests in the common stock of companies that are involved in publicly announced mergers and seeks to generate attractive returns while dampening volatility. This investment is valued at NAV, is redeemable monthly, and is not subject to lock-up restrictions.

4. **Multi-strategy hedge fund** – Consisting of one fund, this fund aims to pursue varying strategies in order to diversify risks and reduce volatility. This investment is valued at NAV, is redeemable quarterly, and is not subject to lock-up restrictions.

5. **Equity market neutral hedge fund** – Consisting of one fund, this strategy invests both long and short in U.S. and global equity securities, with the goal of having little to no net market exposure. This investment is valued at NAV, is redeemable quarterly, and is not subject to lock-up restrictions.

6. **Event driven hedge funds** – Consisting of two funds, this strategy seeks to gain an advantage from pricing inefficiencies that may occur at the onset or in the aftermath of a corporate action or related event. These investments are valued at NAV. Due to contractual lock-up restrictions, approximately 29% of the value of these investments is eligible for redemption quarterly. The remaining 71% of the value of these investments remains restricted for 4 to 20 months.

7. **Macro hedge funds** – Consisting of two funds, this strategy seeks to take advantage of macroeconomic dislocations between countries by trading a number of different markets and financial instruments. This investment is valued at NAV, is redeemable monthly and quarterly, and is not subject to lock-up restrictions.

8. **Risk premia hedge funds** – Consisting of two funds, these strategies seek to capture hedge fund betas through the use of systematic, bottom-up security selection across major hedge fund strategies. Style premia such as value, momentum, and carry help build the long/short portfolios. This investment is valued at NAV, is redeemable at least monthly, and is not subject to lock-up restrictions.

9. **Risk parity funds** – Consisting of two funds, these strategies attempt to build a more efficient portfolio through an equal risk methodology. They take long only positions across equity indices, developed nominal bonds, TIPS, commodities and credit. Diversification benefits decrease both the expected return and volatility thus requiring leverage to maintain a similar return to a more conventional portfolio. This investment is valued at NAV, is redeemable monthly, and is not subject to lock-up restrictions.

10. **Fund-of-funds** – Consisting of one fund, this fund seeks to provide diversification by holding a number of funds within a single fund structure. This investment is valued at NAV, is redeemable monthly, and is not subject to lock-up restrictions.

11. **Pending liquidated hedge funds** – This item consists of 12 funds which have been fully redeemed as of June 30, 2017, for which MOSERS is awaiting final distribution of the proceeds. Approximately 83% of the value was received within 90 days of June 30, 2017. The remaining 17% will be received upon sale of the underlying investments or upon completion of the audit of the firm’s annual financial statements.

12. **Private equity, real estate and timber funds** – MOSERS’ private equity portfolio consists of 48 funds with exposure to buyout funds, distressed funds, infrastructure, energy, royalty funds, and special situations. The real estate portfolio, comprised of five funds, invests mainly in U.S. commercial real estate. The timber portfolio consists of four funds which invest in global timberland. The fair values of the majority of these funds has been determined using net assets valued one quarter in arrears plus current quarter cash flows. These funds are not eligible for redemption. Distributions are received when underlying investments within the funds are liquidated, which, on average, can occur over the span of 5 to 10 years.
Credit Risk
Credit risk is the risk that an issuer or other counterparty to an investment will not fulfill its obligations to MOSERS. As of June 30, 2017, MOSERS’ fixed income assets that are not U.S. government guaranteed represented 36% of fixed income securities. Credit risk associated with all fixed income holdings, including collateral for repurchase agreements, has been included in this report. The tables below summarize MOSERS’ fixed income security exposure levels and credit qualities.

Average Credit Quality and Exposure Levels of Nongovernment Guaranteed Securities

<table>
<thead>
<tr>
<th>Fixed Income Security Type</th>
<th>Fair Value June 30, 2017</th>
<th>Percent of all Fixed Income Assets</th>
<th>Weighted Average Credit Quality</th>
<th>Ratings Dispersion Requiring Further Disclosure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collateralized mortgage obligations</td>
<td>$26,162,520</td>
<td>0.4%</td>
<td>AA</td>
<td>See below</td>
</tr>
<tr>
<td>U.S. government agencies</td>
<td>299,535,000</td>
<td>4.9</td>
<td>AA</td>
<td>See below</td>
</tr>
<tr>
<td>Non-U.S. sovereign</td>
<td>48,598,153</td>
<td>0.8</td>
<td>BBB</td>
<td>See below</td>
</tr>
<tr>
<td>Corporate bonds</td>
<td>1,670,687</td>
<td>0.0</td>
<td>BB</td>
<td>See below</td>
</tr>
<tr>
<td>Bank deposits</td>
<td>550,478,970</td>
<td>9.0</td>
<td>FDIC insured</td>
<td>None</td>
</tr>
<tr>
<td>Repurchase agreements</td>
<td>1,100,035,267</td>
<td>17.9</td>
<td>Not rated</td>
<td>None</td>
</tr>
<tr>
<td>Pooled investments</td>
<td>167,536,670</td>
<td>2.7</td>
<td>AAA</td>
<td>None</td>
</tr>
<tr>
<td><strong>Total nongov’t. guaranteed securities</strong></td>
<td><strong>$2,194,017,267</strong></td>
<td><strong>35.7%</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total fixed income securities</strong></td>
<td><strong>$6,149,921,101</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ratings Dispersion Detail - Fair Value

<table>
<thead>
<tr>
<th>Credit Rating Level</th>
<th>Collateralized Mortgage Obligations</th>
<th>Non-U.S. Sovereign</th>
<th>Corporate Bonds</th>
<th>U.S. Government Agencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA</td>
<td>$26,162,520</td>
<td>$119,637</td>
<td>$150,397</td>
<td>$299,535,000</td>
</tr>
<tr>
<td>A</td>
<td>9,067,829</td>
<td>9,067,829</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BBB</td>
<td>24,720,205</td>
<td>14,690,482</td>
<td>1,412,433</td>
<td></td>
</tr>
<tr>
<td>BB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Rated</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$26,162,520</strong></td>
<td><strong>$48,598,153</strong></td>
<td><strong>$1,670,687</strong></td>
<td><strong>$299,535,000</strong></td>
</tr>
</tbody>
</table>

As a matter of practice, there are no overarching limitations for credit risk exposures within the overall fixed income portfolio. Each individual portfolio within fixed income is managed in accordance with operational guidelines that are specific as to permissible credit quality ranges, exposure levels within individual quality tiers, and average credit quality.

Credit risk for derivative instruments held by the system results from counterparty risk assumed by MOSERS. This is essentially the risk that the counterparty to a MOSERS transaction will be unable to meet its obligation. Information regarding MOSERS’ credit risk related to derivatives is found under the derivatives disclosures on pages 42 of these notes.

Policies related to credit risk pertaining to MOSERS’ securities lending program are found under the securities lending disclosures found on page 43 of these notes.
Interest Rate Risk
Interest rate risk is the risk that changes in interest rates will adversely affect the fair value of an investment. This risk is managed by using the effective duration or option adjusted methodology. It is widely used in the management of fixed income assets by quantifying the risk of interest rate changes. This methodology takes into account optionality on bonds and scales the risk of price changes on bonds depending upon the degree of change in rates and the slope of the yield curve. Within the investment policy, operational guidelines specify the degree of interest rate risk taken within the system’s fixed income portfolios, with the exception of some portfolios in which credit risk is the predominant factor and is also controlled by specific guidelines. MOSERS believes that the reporting of effective duration found in the tables below quantifies to the fullest extent possible the interest rate risk of the system’s fixed income securities.

Effective Duration of Fixed Income Assets by Security Type

<table>
<thead>
<tr>
<th>Fixed Income Security Type</th>
<th>Fair Value</th>
<th>Percent of all Fixed Income Assets</th>
<th>Weighted Average Effective Duration (Years)</th>
<th>Interest Rate Risk Requiring Further Disclosure</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. treasuries</td>
<td>$3,955,903,834</td>
<td>64.3%</td>
<td>8.3</td>
<td>See below</td>
</tr>
<tr>
<td>U.S. government agencies</td>
<td>299,535,000</td>
<td>4.9</td>
<td>0.2</td>
<td>None</td>
</tr>
<tr>
<td>Collateralized mortgage obligations</td>
<td>26,162,520</td>
<td>0.4</td>
<td>0.1</td>
<td>None</td>
</tr>
<tr>
<td>Non-U.S. sovereign</td>
<td>48,598,153</td>
<td>0.8</td>
<td>5.3</td>
<td>None</td>
</tr>
<tr>
<td>Corporate bonds</td>
<td>1,670,687</td>
<td>0.0</td>
<td>5.3</td>
<td>None</td>
</tr>
<tr>
<td>Bank deposits</td>
<td>550,478,970</td>
<td>9.0</td>
<td>0.0</td>
<td>None</td>
</tr>
<tr>
<td>Repurchase agreements</td>
<td>1,100,035,267</td>
<td>17.9</td>
<td>0.0</td>
<td>None</td>
</tr>
<tr>
<td>Pooled investments</td>
<td>167,536,670</td>
<td>2.7</td>
<td>0.0</td>
<td>None</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$6,149,921,101</td>
<td>100.0%</td>
<td>5.4</td>
<td></td>
</tr>
</tbody>
</table>

Effective Duration Analysis of U.S. Treasuries

<table>
<thead>
<tr>
<th>Maturity</th>
<th>Fair Value</th>
<th>Average Effective Duration of the Security Type (Years)</th>
<th>Contribution to Effective Duration (Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1 year to maturity</td>
<td>$ 275,455,406</td>
<td>0.2</td>
<td>0.0</td>
</tr>
<tr>
<td>1- to 10- year maturities</td>
<td>2,641,400,055</td>
<td>5.5</td>
<td>3.7</td>
</tr>
<tr>
<td>Long coupon treasuries</td>
<td>1,039,048,373</td>
<td>17.4</td>
<td>4.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$3,955,903,834</td>
<td>8.3</td>
<td></td>
</tr>
</tbody>
</table>

MOSERS invests in mortgage-backed securities, which are reported at fair value in the Statements of Fiduciary Net Position of the pension trust funds. Such securities have embedded within them the risk of being called, whereby the issuer has the option to keep the debt outstanding in rising interest rate environments or repay the debt in declining interest rate environments, a factor that advantages the issuer. MOSERS invests in these securities to diversify the portfolio with high quality and liquid investments which capture a significant yield premium that is intended to compensate for the call risk. This risk is incorporated within the effective duration calculation used in the interest rate risk analysis.
Repurchase Agreements

Tri-party repurchase agreements (repos) are a secured loan by a financial institution with the collateral held at a custodian bank. In a tri-party repo transaction, MOSERS transfers cash to a financial institution and the financial institution transfers securities to the custodian bank. Simultaneously, the financial institution promises to repay the loan in the future plus interest in exchange for the return of the securities.

Reverse repurchase agreements (reverse repos) are used to convert securities into cash. In a reverse repo transaction, MOSERS transfers securities that are owned in the portfolio to a financial institution and the financial institution transfers cash to MOSERS. Simultaneously, MOSERS promises to repay the loan in the future plus interest in exchange for the return of the securities.

Typical collateral for repos and reverse repos include treasury securities, agency securities, mortgage-backed securities, investment grade corporate bonds, commercial paper, and common stock. Repos and reverse repos are typically done for an overnight term; however, they can be done for a longer term. MOSERS enters into repo transactions to earn interest on short-term funds and enters into reverse repos to finance the purchase of additional securities.

The yield earned by MOSERS on the repo transactions ranged from 0.25% to 1.31% and had maturities of one to five days. The yield earned by the counterparties on the reverse repo transactions ranged from 0.55% to 1.32% and had maturities of one month to one year. The maturities of the investments made with reverse repo proceeds generally have maturities of one to 30 years.

In repo transactions, MOSERS may have credit risk if the counterparty fails to repay the loan and the value of the securities held as collateral fall below the loan balance. To minimize this risk, MOSERS requires the financial institution to send collateral with a market value greater than the value of the loan and revalues the collateral on a daily basis. As of fiscal year end, MOSERS held approximately $39.5 million of counterparty collateral in excess to the repo balance.

In a reverse repo transaction, MOSERS may be subject to credit risk if the counterparty fails to return the securities and the value of the securities held as collateral rise above the loan balance. To minimize this risk, MOSERS sends the minimum amount of collateral required by the financial institution and requires the financial institution to revalue the collateral and return excess collateral on a daily basis. As of fiscal year end, counterparties held approximately $30.9 million of MOSERS’ collateral in excess to the reverse repo balance.

The tables below summarize MOSERS’ exposure for repo and reverse repo transactions.

### Repurchase Agreements by Collateral Type

<table>
<thead>
<tr>
<th>Collateral Type</th>
<th>Fair Value of Collateral June 30, 2017</th>
<th>Fair Value Including Accrued Interest of Repos June 30, 2017</th>
<th>Excess (Deficit) Collateral</th>
<th>Percent Over Collateralized</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. treasuries/U.S. agencies</td>
<td>$841,500,022</td>
<td>$825,000,000</td>
<td>$16,500,022</td>
<td>0.2%</td>
</tr>
<tr>
<td>Common stock</td>
<td>298,027,065</td>
<td>275,000,000</td>
<td>23,027,065</td>
<td>7.7%</td>
</tr>
<tr>
<td>Accrued interest</td>
<td>0</td>
<td>35,267</td>
<td>(35,267)</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$1,139,527,087</strong></td>
<td><strong>$1,100,035,267</strong></td>
<td><strong>$39,491,820</strong></td>
<td><strong>3.6%</strong></td>
</tr>
</tbody>
</table>

### Reverse Repurchase Agreements by Collateral Type

<table>
<thead>
<tr>
<th>Collateral Type</th>
<th>Fair Value of Collateral June 30, 2017</th>
<th>Fair Value Including Accrued Interest of Reverse Repos June 30, 2017</th>
<th>Excess (Deficit) Collateral</th>
<th>Percent Over Collateralized</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. treasuries</td>
<td>$3,412,898,141</td>
<td>$3,362,281,438</td>
<td>$50,616,703</td>
<td>1.5%</td>
</tr>
<tr>
<td>Receivables</td>
<td>(8,232,672)</td>
<td>0</td>
<td>(8,232,672)</td>
<td>(0.3%)</td>
</tr>
<tr>
<td>Accrued interest</td>
<td>0</td>
<td>11,492,117</td>
<td>(11,492,117)</td>
<td>(3.5%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$3,404,665,469</strong></td>
<td><strong>$3,373,773,555</strong></td>
<td><strong>$30,891,914</strong></td>
<td><strong>0.9%</strong></td>
</tr>
</tbody>
</table>
Foreign Currency Risk

Foreign currency risk is the risk that changes in exchange rates will adversely impact the fair value of an investment. MOSERS’ currency risk exposures, or exchange rate risk, primarily reside within MOSERS’ international equity investment holdings. MOSERS’ implementation policy allows external managers to decide what action to take regarding their respective portfolio’s foreign currency exposures using currency forward contracts. MOSERS’ exposure to foreign currency risk in U.S. dollars, as of June 30, 2017, is highlighted in the table below.

<table>
<thead>
<tr>
<th>Currency</th>
<th>Cash &amp; Cash Equivalents</th>
<th>Equities</th>
<th>Fixed Income</th>
<th>Alternatives</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentine Peso</td>
<td>$1,599,168</td>
<td>$82,420</td>
<td>$276,290</td>
<td>$1,240,458</td>
<td></td>
</tr>
<tr>
<td>Australian Dollar</td>
<td>$10,904,231</td>
<td>1,443,236</td>
<td>160,100</td>
<td>16,203,537</td>
<td></td>
</tr>
<tr>
<td>Brazilian Real</td>
<td>(704,907)</td>
<td>4,025,936</td>
<td>374,220</td>
<td>2,946,809</td>
<td></td>
</tr>
<tr>
<td>Chilean Peso</td>
<td>31,464</td>
<td>490,843</td>
<td>4,375,831</td>
<td>4,874,245</td>
<td></td>
</tr>
<tr>
<td>Colombian Peso</td>
<td>7,571</td>
<td>287,392</td>
<td></td>
<td>300,055</td>
<td></td>
</tr>
<tr>
<td>Czech Koruna</td>
<td>12,663</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Danish Krone</td>
<td></td>
<td>7,915,672</td>
<td></td>
<td>7,915,672</td>
<td></td>
</tr>
<tr>
<td>Egyptian Pound</td>
<td></td>
<td></td>
<td></td>
<td>189,086</td>
<td></td>
</tr>
<tr>
<td>Euro</td>
<td>$154,650,813</td>
<td>5,256,681</td>
<td>$23,990,878</td>
<td>167,749,381</td>
<td></td>
</tr>
<tr>
<td>Hong Kong Dollar</td>
<td>106,050,759</td>
<td>526,344</td>
<td></td>
<td>106,577,103</td>
<td></td>
</tr>
<tr>
<td>Hungarian Forint</td>
<td>7,847</td>
<td></td>
<td></td>
<td>534,191</td>
<td></td>
</tr>
<tr>
<td>Indian Rupee</td>
<td>14,430,341</td>
<td></td>
<td></td>
<td>14,545,330</td>
<td></td>
</tr>
<tr>
<td>Indonesian Rupiah</td>
<td>4,038,438</td>
<td></td>
<td></td>
<td>9,646,896</td>
<td></td>
</tr>
<tr>
<td>Israeli Shekel</td>
<td></td>
<td></td>
<td></td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Japanese Yen</td>
<td>270,199,689</td>
<td></td>
<td></td>
<td>272,264,580</td>
<td></td>
</tr>
<tr>
<td>Malaysian Ringgit</td>
<td>3,919,716</td>
<td></td>
<td></td>
<td>6,774,815</td>
<td></td>
</tr>
<tr>
<td>Mexican Peso</td>
<td>8,140,260</td>
<td></td>
<td></td>
<td>16,848,061</td>
<td></td>
</tr>
<tr>
<td>Norwegian Krone</td>
<td>2,852,118</td>
<td></td>
<td></td>
<td>2,852,118</td>
<td></td>
</tr>
<tr>
<td>Pakistani Rupee</td>
<td>117,144</td>
<td></td>
<td></td>
<td>117,144</td>
<td></td>
</tr>
<tr>
<td>Peruvian Nuevo Sol</td>
<td>2</td>
<td>849,040</td>
<td></td>
<td>849,042</td>
<td></td>
</tr>
<tr>
<td>Philippine Peso</td>
<td>1,934,786</td>
<td></td>
<td></td>
<td>1,947,141</td>
<td></td>
</tr>
<tr>
<td>Polish Zloty</td>
<td>2,153,764</td>
<td></td>
<td></td>
<td>7,779,180</td>
<td></td>
</tr>
<tr>
<td>Qatari Riyal</td>
<td>1,093,256</td>
<td></td>
<td></td>
<td>1,103,443</td>
<td></td>
</tr>
<tr>
<td>Russian Ruble</td>
<td>1,571,962</td>
<td></td>
<td></td>
<td>6,325,522</td>
<td></td>
</tr>
<tr>
<td>Singapore Dollar</td>
<td>36,481,683</td>
<td></td>
<td></td>
<td>36,481,683</td>
<td></td>
</tr>
<tr>
<td>South African Rand</td>
<td>10,851,140</td>
<td></td>
<td></td>
<td>15,567,194</td>
<td></td>
</tr>
<tr>
<td>South Korean Won</td>
<td>40,899,836</td>
<td></td>
<td></td>
<td>41,514,327</td>
<td></td>
</tr>
<tr>
<td>Swedish Krona</td>
<td>12,276,390</td>
<td></td>
<td></td>
<td>12,276,390</td>
<td></td>
</tr>
<tr>
<td>Swiss Franc</td>
<td>109,896,095</td>
<td></td>
<td></td>
<td>109,896,095</td>
<td></td>
</tr>
<tr>
<td>Taiwan New Dollar</td>
<td>52,296,316</td>
<td></td>
<td></td>
<td>52,456,674</td>
<td></td>
</tr>
<tr>
<td>Thai Baht</td>
<td>30,524,380</td>
<td></td>
<td></td>
<td>32,451,873</td>
<td></td>
</tr>
<tr>
<td>Turkish Lira</td>
<td>11,342,429</td>
<td></td>
<td></td>
<td>14,917,503</td>
<td></td>
</tr>
<tr>
<td>United Arab Emirates Dirham</td>
<td>1,089,834</td>
<td></td>
<td></td>
<td>1,090,576</td>
<td></td>
</tr>
<tr>
<td>United Kingdom Pound Sterling</td>
<td>(323,037)</td>
<td>157,342,198</td>
<td>(296,070)</td>
<td>156,723,091</td>
<td></td>
</tr>
<tr>
<td>Uruguayan Peso</td>
<td></td>
<td></td>
<td></td>
<td>455,548</td>
<td></td>
</tr>
</tbody>
</table>

$(14,026,547) $1,059,853,461 $54,972,030 $23,990,878 $1,124,789,822
Derivatives
Derivative instruments are financial contracts whose values depend on the values of one or more underlying assets, reference rates, or financial indices. They include futures contracts, forward foreign currency exchange contracts, and swap contracts. The following tables summarize the various contracts in the portfolio, as of June 30, 2017.

**Futures Contracts**

<table>
<thead>
<tr>
<th>Futures Contract</th>
<th>Notional Value</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currency futures</td>
<td>$19,226,121</td>
<td>$(944,974)</td>
</tr>
<tr>
<td>Fixed income futures</td>
<td>1,281,948,801</td>
<td>23,694,113</td>
</tr>
<tr>
<td>Equity index futures</td>
<td>147,312,359</td>
<td>1,091,969</td>
</tr>
<tr>
<td>Commodity futures</td>
<td>144,977,942</td>
<td>256,330</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$1,593,465,223</td>
<td>$24,097,438</td>
</tr>
</tbody>
</table>

**Foreign Currency Forward Contracts at June 30, 2017**

<table>
<thead>
<tr>
<th>Currency</th>
<th>Net Notional Long (Short)</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazilian Real</td>
<td>$2,024,588</td>
<td>$4,358</td>
</tr>
<tr>
<td>Chiliean Peso</td>
<td>1,087,625</td>
<td>4,853</td>
</tr>
<tr>
<td>Colombian Peso</td>
<td>(131,880)</td>
<td>14,758</td>
</tr>
<tr>
<td>Czech Koruna</td>
<td>3,577,017</td>
<td>68,668</td>
</tr>
<tr>
<td>Euro</td>
<td>491,653</td>
<td>9,394</td>
</tr>
<tr>
<td>Indonesian Rupiah</td>
<td>(205,185)</td>
<td>(235)</td>
</tr>
<tr>
<td>Indian Rupee</td>
<td>1,042,572</td>
<td>(3,791)</td>
</tr>
<tr>
<td>Mexican Peso</td>
<td>(3,430,145)</td>
<td>(39,477)</td>
</tr>
<tr>
<td>Peruvian Nuevo Sol</td>
<td>(291,136)</td>
<td>(2,622)</td>
</tr>
<tr>
<td>Polish Zloty</td>
<td>556,345</td>
<td>12,887</td>
</tr>
<tr>
<td>Romanian Leu</td>
<td>2,861,817</td>
<td>80,478</td>
</tr>
<tr>
<td>Russian Ruble</td>
<td>(2,507,001)</td>
<td>4,052</td>
</tr>
<tr>
<td>Thai Baht</td>
<td>521,734</td>
<td>(41,191)</td>
</tr>
<tr>
<td>Turkish Lira</td>
<td>882,520</td>
<td>4,349</td>
</tr>
<tr>
<td>Uruguayan Peso</td>
<td>415,787</td>
<td>14,787</td>
</tr>
<tr>
<td>South African Rand</td>
<td>(1,731,409)</td>
<td>29,181</td>
</tr>
<tr>
<td>U.S. Dollar</td>
<td>(5,004,453)</td>
<td>0</td>
</tr>
<tr>
<td><strong>Foreign currency forward contract asset (liability)</strong></td>
<td>$160,449</td>
<td>$160,449</td>
</tr>
</tbody>
</table>

**Swap Contracts**

<table>
<thead>
<tr>
<th>Counterparty Credit Rating</th>
<th>Notional Value</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total return swaps - equity</td>
<td>$69,925,100</td>
<td>$(4,560,844)</td>
</tr>
<tr>
<td>A+</td>
<td>$69,925,100</td>
<td>$(4,560,844)</td>
</tr>
<tr>
<td>Total</td>
<td>$69,925,100</td>
<td>$(4,560,844)</td>
</tr>
</tbody>
</table>

**Total return swaps - fixed income**

| A+                        | $524,643,852   | $8,414,108  |
| Total                     | $524,643,852   | $8,414,108  |

**Total return swaps - commodities**

| A+                        | $657,937,233   | $0          |
| A                         | 238,956,839    | 0           |
| **Total**                 | $896,894,072   | $0          |
While the board has no formal policy specific to derivatives, the MOSERS investment implementation program, through its external managers, holds investments in futures contracts, swap contracts, and forward foreign currency exchange. MOSERS enters into these certain derivative instruments as investments primarily to enhance the performance and reduce the volatility of its portfolio. It enters swaps and futures contracts to gain or hedge exposure to certain markets and to manage interest rate risk and enters into forward foreign currency exchange contracts primarily to hedge foreign currency exposure.

The notional values associated with these derivative instruments are generally not recorded in the financial statements; however, the amounts for the exposure on these instruments are recorded in the Statements of Fiduciary Net Position and the total changes in fair value for the year are included as investment income in the Statements of Changes in Fiduciary Net Position. For the year ended June 30, 2017, the change in fair value in the swap contracts resulted in a loss of $106.1 million of investment income. The change in fair value in the futures contracts resulted in a loss of $72.6 million of investment income. The change in fair value in the foreign exchange contracts resulted in a loss of $3.2 million of investment income. MOSERS does not anticipate additional significant market risk from the derivative arrangements.

MOSERS could be exposed to risk if the counterparties to the contracts are unable to meet the terms of the contracts. MOSERS’ investment managers seek to control this risk through counterparty credit evaluations and approvals, counterparty credit limits, and exposure monitoring procedures. MOSERS anticipates that the counterparties will be able to satisfy their obligations under the contracts. Investments in limited partnerships and commingled funds may include derivatives that are not shown in the derivative totals.

Limited Partnerships
Many of MOSERS’ alternative investments are organized in the form of limited partnerships. In these partnerships, the manager is a general partner and the limited partners are the investors. Investments in limited partnerships are accounted for using the equity method of accounting and their earnings or losses for the period are included in investment income using the equity method.

As of June 30, 2017, MOSERS had contracts with more than 83 limited partnerships across various types of alternative investments which collectively represent 47% of the total fund. A Schedule of Limited Partnerships follows on pages 44-45.

Securities Lending Program
The board of trustees’ investment policy permits the pension trust funds to participate in a securities lending program. Fixed income, international equity and domestic equity securities of the pension trust funds are loaned to participating brokers who provide collateral in the form of cash, U.S. Treasury or government agency securities, or letters of credit issued by approved banks. Collateral must be provided in the amount of 102% of market value for domestic loans and 105% of market value for international loans. MOSERS does not have the authority to pledge or sell collateral securities, without borrower default.

As of June 30, 2017, Deutsche Bank AG, New York Branch, served as the agent for the fixed income, domestic equity and international equity securities lending programs. In this capacity, MOSERS reduces credit risk by allowing Deutsche Bank to lend these securities to a diverse group of dealers on behalf of MOSERS. Indemnification against dealer default is provided by Deutsche Bank AG, a “BBB rated” bank. With each of MOSERS’ securities lending programs, a majority of loans are open loans and can be terminated on demand by either MOSERS or the borrower. Net income from the three lending programs is split on a 90/10 basis between MOSERS and Deutsche Bank, respectively.

Daily monitoring of securities that are on loan ensures proper collateralization levels and mitigates counterparty risk. Cash collateral from all three programs is commingled and invested in a separately managed short-term investment account for MOSERS. This cash collateral account is managed by Deutsche Bank. On June 30, 2017, there were no securities on loan or cash collateral held in the account. For all of the securities lending operational services, the custodian is paid an annual fee, which is netted out against MOSERS’ earnings in the securities lending programs managed by Deutsche Bank. The custodian fee is not being charged while there are no loans outstanding.
### Partnership Name

<table>
<thead>
<tr>
<th>Partnership Name</th>
<th>Style</th>
<th>Investments at Fair Value as of June 30, 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actis Emerging Markets III</td>
<td>Opportunistic global equities – emerging markets</td>
<td>$ 11,393,891</td>
</tr>
<tr>
<td>Actis Emerging Markets IV</td>
<td>Opportunistic global equities – emerging markets</td>
<td>27,006,111</td>
</tr>
<tr>
<td>African Development Partners I, LLC</td>
<td>Opportunistic global equities – emerging markets</td>
<td>23,311,855</td>
</tr>
<tr>
<td>African Development Partners II, LLC</td>
<td>Opportunistic global equities – emerging markets</td>
<td>19,758,189</td>
</tr>
<tr>
<td>Alinda Infrastructure Fund I, LP</td>
<td>Opportunistic global equities – infrastructure</td>
<td>21,005,641</td>
</tr>
<tr>
<td>AQR DELTA Sapphire Fund, LP</td>
<td>Alternative beta – multi-strategy</td>
<td>348,556,900</td>
</tr>
<tr>
<td>AQR Global Risk Premium Fund IV, LP</td>
<td>External beta-balanced – risk parity</td>
<td>405,631,864</td>
</tr>
<tr>
<td>AQR Style Premia Fund, LP</td>
<td>Alternative beta – multi-strategy</td>
<td>59,867,447</td>
</tr>
<tr>
<td>Axiom Asia Private Capital Fund II, LP</td>
<td>Opportunistic global equities – emerging markets</td>
<td>37,773,482</td>
</tr>
<tr>
<td>Axiom Asia Private Capital Fund III, LP</td>
<td>Opportunistic global equities – emerging markets</td>
<td>48,051,826</td>
</tr>
<tr>
<td>Axxon Brazil Private Equity Fund II B, LP</td>
<td>Opportunistic global equities – emerging markets</td>
<td>25,657,177</td>
</tr>
<tr>
<td>Bayview Opportunity Domestic III b, LP</td>
<td>Opportunistic global equities – opportunistic mortgages</td>
<td>18,105,558</td>
</tr>
<tr>
<td>Bayview Opportunity Domestic, LP</td>
<td>Opportunistic global equities – opportunistic mortgages</td>
<td>4,197,423</td>
</tr>
<tr>
<td>Blackstone Real Estate Partners IV</td>
<td>Opportunistic global equities – active real estate</td>
<td>11,284,656</td>
</tr>
<tr>
<td>Blackstone Real Estate Partners V</td>
<td>Opportunistic global equities – active real estate</td>
<td>31,686,366</td>
</tr>
<tr>
<td>Blackstone Real Estate Partners VI</td>
<td>Opportunistic global equities – active real estate</td>
<td>13,915,179</td>
</tr>
<tr>
<td>Blackstone Real Estate Partners VII</td>
<td>Opportunistic global equities – active real estate</td>
<td>60,296,117</td>
</tr>
<tr>
<td>Blackstone Topaz Fund, LP</td>
<td>Alternative beta multi-strategy – fund-of-funds</td>
<td>240,743,966</td>
</tr>
<tr>
<td>Blakeney Onyx, LP</td>
<td>Opportunistic global equities – emerging markets</td>
<td>51,978,370</td>
</tr>
<tr>
<td>Bridgewater Associates – All Weather, LLC</td>
<td>External beta-balanced – risk parity</td>
<td>461,643,476</td>
</tr>
<tr>
<td>Bridgewater Associates – Diamond Ridge Fund, LLC</td>
<td>Alternative beta – global macro</td>
<td>100,543,340</td>
</tr>
<tr>
<td>Campbell Timber Fund II A, LP</td>
<td>Opportunistic global equities – timberland</td>
<td>1,005,329</td>
</tr>
<tr>
<td>CarVal Investors CVI Global Value Fund A, LP – private debt</td>
<td>Opportunistic global equities – distressed real estate debt</td>
<td>7,200,000</td>
</tr>
<tr>
<td>CarVal Investors CVI Global Value Fund A, LP – real estate</td>
<td>Opportunistic global equities – distressed real estate debt</td>
<td>7,200,000</td>
</tr>
<tr>
<td>Catalyst Fund III, LP</td>
<td>Opportunistic global equities – Canadian distressed debt</td>
<td>56,200,437</td>
</tr>
<tr>
<td>Catalyst Fund IV, LP</td>
<td>Opportunistic global equities – Canadian distressed debt</td>
<td>23,795,378</td>
</tr>
<tr>
<td>Catalyst Fund V, LP</td>
<td>Opportunistic global equities – Canadian distressed debt</td>
<td>19,327,670</td>
</tr>
<tr>
<td>Catterton Partners V, LP</td>
<td>Opportunistic global equities – corporate buyout</td>
<td>2,731,889</td>
</tr>
<tr>
<td>Cornwall Domestic, LP</td>
<td>Alternative beta – multi-strategy</td>
<td>62,747,524</td>
</tr>
<tr>
<td>Davidson Kempner Institutional Partners, LP</td>
<td>Alternative beta – event driven</td>
<td>28,676,279</td>
</tr>
<tr>
<td>DRI Capital – LSRC</td>
<td>Opportunistic global equities – intellectual property</td>
<td>14,818,718</td>
</tr>
<tr>
<td>EIG Energy Co-investment I</td>
<td>Opportunistic global equities – energy – mezzanine</td>
<td>5,167,130</td>
</tr>
<tr>
<td>EIG Energy Fund XIV, LP</td>
<td>Opportunistic global equities – energy – mezzanine</td>
<td>6,953,126</td>
</tr>
<tr>
<td>EIG Energy Fund XV, LP</td>
<td>Opportunistic global equities – energy – mezzanine</td>
<td>31,140,378</td>
</tr>
<tr>
<td>EIG Energy Fund XVI, LP</td>
<td>Opportunistic global equities – energy – mezzanine</td>
<td>23,559,874</td>
</tr>
<tr>
<td>Elliott International, Ltd.</td>
<td>Alternative beta – multi-strategy</td>
<td>190,191,000</td>
</tr>
<tr>
<td>Eton Park Fund, LP</td>
<td>Alternative beta – multi-strategy</td>
<td>350,900</td>
</tr>
<tr>
<td>Farallon Capital Institutional Partners, LP</td>
<td>Alternative beta – multi-strategy</td>
<td>2,500,000</td>
</tr>
<tr>
<td>Gaoling Fund, LP</td>
<td>Opportunistic global equities – long/short – equity</td>
<td>125,614,684</td>
</tr>
<tr>
<td>Garnet Sky Investors Company Ltd.</td>
<td>Opportunistic global equities – timberland</td>
<td>123,828,613</td>
</tr>
<tr>
<td>Gateway Energy &amp; Resource Holdings, LLC</td>
<td>Opportunistic global equities – diversified</td>
<td>15,758,412</td>
</tr>
<tr>
<td>GCM Sidecar, LP</td>
<td>Opportunistic global equities – long/short – equity</td>
<td>59,227,608</td>
</tr>
<tr>
<td>Glenview Capital Opportunity Fund, LP</td>
<td>Opportunistic global equities – long/short – equity</td>
<td>39,781,005</td>
</tr>
<tr>
<td>Global Forest Partners GT17 Institutional Investors Company, Ltd.</td>
<td>Opportunistic global equities – timberland</td>
<td>17,889,381</td>
</tr>
<tr>
<td>HBK Merger Strategies Offshore Fund, Ltd.</td>
<td>Alternative beta – merger arbitrage</td>
<td>115,091,118</td>
</tr>
</tbody>
</table>

*Schedule of Limited Partnerships continued on page 45*
### Investments at Fair Value as of June 30, 2017

<table>
<thead>
<tr>
<th>Partnership Name</th>
<th>Style</th>
<th>Investments</th>
</tr>
</thead>
<tbody>
<tr>
<td>JLL Partners Fund V, LP</td>
<td>Opportunistic global equities – corporate buyout</td>
<td>$12,297,620</td>
</tr>
<tr>
<td>JLL Partners Fund VI, LP</td>
<td>Opportunistic global equities – corporate buyout</td>
<td>$53,135,434</td>
</tr>
<tr>
<td>King Street Capital, LP</td>
<td>Alternative beta – credit driven</td>
<td>$4,299,013</td>
</tr>
<tr>
<td>King Street Capital, Ltd.</td>
<td>Alternative beta – credit driven</td>
<td>$345,655</td>
</tr>
<tr>
<td>Linden Capital Partners Co-investment, LP</td>
<td>Opportunistic global equities – corporate buyout</td>
<td>$10,588,235</td>
</tr>
<tr>
<td>Linden Capital Partners II, LP</td>
<td>Opportunistic global equities – corporate buyout</td>
<td>$38,689,144</td>
</tr>
<tr>
<td>Mast Credit Opportunities I, LP</td>
<td>Alternative beta – credit driven</td>
<td>$21,196,607</td>
</tr>
<tr>
<td>Merit Energy Partners F-II, LP</td>
<td>Alternative beta – energy – oil and gas</td>
<td>$5,154,997</td>
</tr>
<tr>
<td>MHR Institutional Partners II A, LP</td>
<td>Alternative beta – distressed debt</td>
<td>$26,720,074</td>
</tr>
<tr>
<td>MHR Institutional Partners III, LP</td>
<td>Alternative beta – distressed debt</td>
<td>$32,873,342</td>
</tr>
<tr>
<td>MHR Institutional Partners IV, LP</td>
<td>Alternative beta – distressed debt</td>
<td>$10,047,407</td>
</tr>
<tr>
<td>Linden Capital Partners Co-investment</td>
<td>Opportunistic global equities – direct secondaries</td>
<td>$4,136,056</td>
</tr>
<tr>
<td>Millennium Technology Value Partners II, LP</td>
<td>Opportunistic global equities – direct secondaries</td>
<td>$15,965,832</td>
</tr>
<tr>
<td>Moon Capital Global Equity Offshore Fund, Ltd.</td>
<td>Opportunistic global equities – long/short – equity</td>
<td>$825,930</td>
</tr>
<tr>
<td>Newport Pioneer, LLC</td>
<td>Alternative beta multi-strategy – fund-of-funds</td>
<td>$20,000</td>
</tr>
<tr>
<td>Oaktree European Credit Opportunities Fund, LP</td>
<td>Opportunistic global equities – European loans</td>
<td>$679,023</td>
</tr>
<tr>
<td>OCM/GFI Power Opportunities Fund II, LP</td>
<td>Opportunistic global equities – corporate buyout</td>
<td>$115,743</td>
</tr>
<tr>
<td>OCM Opportunities Fund IV b, LP</td>
<td>Alternative beta – distressed debt</td>
<td>$78,224</td>
</tr>
<tr>
<td>OCM Opportunities Fund VII b, LP</td>
<td>Alternative beta – distressed debt</td>
<td>$7,228,543</td>
</tr>
<tr>
<td>OCM Opportunities Fund VIII b, LP</td>
<td>Alternative beta – distressed debt</td>
<td>$15,585,875</td>
</tr>
<tr>
<td>OCM Power Opportunities Fund III, LP</td>
<td>Opportunistic global equities – corporate buyout</td>
<td>$13,357,793</td>
</tr>
<tr>
<td>OCM Real Estate Opportunities Fund III, LP</td>
<td>Opportunistic global equities – active real estate</td>
<td>$1,001,289</td>
</tr>
<tr>
<td>Perry Partners, LP</td>
<td>Alternative beta – multi-strategy</td>
<td>$40,458</td>
</tr>
<tr>
<td>Pharo Macro Fund, Ltd.</td>
<td>Alternative beta – global macro</td>
<td>$122,709,138</td>
</tr>
<tr>
<td>Resource Management Service – Wildwood Timberlands, LLC</td>
<td>Opportunistic global equities – timberland</td>
<td>$73,420,187</td>
</tr>
<tr>
<td>Silver Creek Special Opportunities Fund I, LP</td>
<td>Opportunistic global equities – fund-of-funds (special situations)</td>
<td>$9,612,857</td>
</tr>
<tr>
<td>Silver Creek Special Opportunities Fund II, LP</td>
<td>Opportunistic global equities – fund-of-funds (special situations)</td>
<td>$12,632,356</td>
</tr>
<tr>
<td>Silver Lake Partners II, LP</td>
<td>Opportunistic global equities – corporate buyout</td>
<td>$4,348,208</td>
</tr>
<tr>
<td>Siris II Co-investment I</td>
<td>Opportunistic global equities – corporate buyout</td>
<td>$3,983,438</td>
</tr>
<tr>
<td>Siris II Co-investment II</td>
<td>Opportunistic global equities – corporate buyout</td>
<td>$7,500,000</td>
</tr>
<tr>
<td>Standard Investment Research Hedged Equity Fund, LP</td>
<td>Alternative beta – equity market neutral</td>
<td>$99,796,938</td>
</tr>
<tr>
<td>StepStone Capital Buyout Fund I, LP</td>
<td>Opportunistic global equities – corporate buyout – fund-of-funds</td>
<td>$6,880,171</td>
</tr>
<tr>
<td>StepStone Capital Buyout Fund II, LP</td>
<td>Opportunistic global equities – corporate buyout – fund-of-funds</td>
<td>$18,096,782</td>
</tr>
<tr>
<td>StepStone Opportunities Fund II, LP</td>
<td>Opportunistic global equities – corporate buyout – fund-of-funds</td>
<td>$950,711</td>
</tr>
<tr>
<td>TPG-Axon Partners (Offshore) Ltd</td>
<td>Opportunistic global equities – long/short – equity</td>
<td>$3,320,083</td>
</tr>
<tr>
<td>Wisium Balanced Fund, LP</td>
<td>Opportunistic global equities – long/short – equity</td>
<td>$3,460,388</td>
</tr>
<tr>
<td>Wellington Management – Spindrift Investors (Bermuda)</td>
<td>Opportunistic global equities – long/short – equity</td>
<td>$414,115</td>
</tr>
<tr>
<td>Other Miscellaneous</td>
<td>Miscellaneous</td>
<td>$12,496</td>
</tr>
</tbody>
</table>

**Total**: $3,811,591,914
## Summary of Fair Value of Investments as of June 30, 2017

<table>
<thead>
<tr>
<th></th>
<th>Pension Trust Funds</th>
<th>Internal Service Funds</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Investments</td>
<td></td>
<td>Investments</td>
<td></td>
</tr>
<tr>
<td></td>
<td>at Cost Value</td>
<td>at Fair Value</td>
<td>at Cost Value</td>
<td>at Fair Value</td>
</tr>
<tr>
<td>Corporate bonds</td>
<td>225,519</td>
<td>147,344</td>
<td>Convertible bonds</td>
<td>649,291</td>
</tr>
<tr>
<td>U.S. dollar-denominated international corporate bonds</td>
<td>1,263,652</td>
<td>1,201,331</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limited partnerships</td>
<td>2,464,132,351</td>
<td>3,811,591,914</td>
<td>Common stock</td>
<td>220,586,960</td>
</tr>
<tr>
<td>International equities</td>
<td>172,972,066</td>
<td>981,291,002</td>
<td>Foreign currency</td>
<td>17,749</td>
</tr>
<tr>
<td>Real estate investment trust</td>
<td>3,617</td>
<td>8,384</td>
<td>Repurchase agreements</td>
<td>10,553,752</td>
</tr>
<tr>
<td>Short-term investment funds</td>
<td>2,418,765,451</td>
<td>2,418,765,451</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total investments</td>
<td>$9,427,333,380</td>
<td>$11,447,909,995</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Reconciliation to investments on Statement of Fiduciary Net Position

<table>
<thead>
<tr>
<th></th>
<th>Pension Trust Funds</th>
<th>Internal Service Funds</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total from above</td>
<td>$11,447,909,995</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less short-term investments:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repurchase agreements</td>
<td>(10,553,752)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-term investment funds</td>
<td>(2,418,765,451)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investments on Statement of Fiduciary Net Position</td>
<td>$9,018,590,792</td>
<td>$4,291,721</td>
<td>$4,291,721</td>
<td></td>
</tr>
</tbody>
</table>

Due to space limitations and printing costs, a detailed listing of the investment holdings and transactions is not provided in this annual report; however, the detailed reports are available for review as an appendix to this report at the MOSERS office.
(4) Capital Assets

Office building, furniture, fixtures, and equipment costing $1,000 or more when acquired are recorded at cost at the time of acquisition and are reported net of accumulated depreciation. Improvements, which increase the useful life of the property, are also capitalized. Maintenance and repairs are charged to expense as incurred. Depreciation is computed using the straight-line method over the estimated useful life of the related assets according to the following guidelines:

- 5 years for furniture, fixtures, and equipment
- 40 years for building
- 5 years for software and licensing

Below are schedules of the capital asset account balances for the pension trust funds and the internal service funds – State of Missouri Deferred Compensation Plan for the year ended June 30, 2017.

Pension Trust Funds

Capital Asset Account

<table>
<thead>
<tr>
<th>Capital assets</th>
<th>Land</th>
<th>Building and Building Improvements</th>
<th>Furniture Fixtures and Equipment</th>
<th>Software and Licensing</th>
<th>Total Capital Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balances June 30, 2016</td>
<td>$267,286</td>
<td>$4,284,337</td>
<td>$1,285,636</td>
<td>$724,563</td>
<td>$6,561,822</td>
</tr>
<tr>
<td>Additions</td>
<td>0</td>
<td>4,225</td>
<td>32,856</td>
<td>11,753</td>
<td>48,834</td>
</tr>
<tr>
<td>Deletions</td>
<td>0</td>
<td>(45,380)</td>
<td>(23,553)</td>
<td>0</td>
<td>(68,933)</td>
</tr>
<tr>
<td>Balances June 30, 2017</td>
<td>267,286</td>
<td>4,243,182</td>
<td>1,294,939</td>
<td>736,316</td>
<td>6,541,723</td>
</tr>
</tbody>
</table>

Accumulated depreciation

<table>
<thead>
<tr>
<th>Accumulated depreciation</th>
<th>Land</th>
<th>Building and Building Improvements</th>
<th>Furniture Fixtures and Equipment</th>
<th>Software and Licensing</th>
<th>Total Capital Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balances June 30, 2016</td>
<td>0</td>
<td>1,720,870</td>
<td>1,021,529</td>
<td>277,522</td>
<td>3,019,921</td>
</tr>
<tr>
<td>Depreciation expense</td>
<td>0</td>
<td>148,438</td>
<td>64,292</td>
<td>38,126</td>
<td>250,856</td>
</tr>
<tr>
<td>Deletions</td>
<td>0</td>
<td>(21,560)</td>
<td>(23,554)</td>
<td>0</td>
<td>(45,114)</td>
</tr>
<tr>
<td>Balances June 30, 2017</td>
<td>0</td>
<td>1,847,748</td>
<td>1,062,267</td>
<td>315,648</td>
<td>3,225,663</td>
</tr>
</tbody>
</table>

Net capital assets June 30, 2017

| Net capital assets June 30, 2017 | $267,286 | $2,395,434 | $232,672 | $420,668 | $3,316,060 |

Internal Service Funds

Capital Asset Account

<table>
<thead>
<tr>
<th>Capital assets</th>
<th>Leasehold Improvements</th>
<th>Furniture Fixtures and Equipment</th>
<th>Software and Licensing</th>
<th>Total Capital Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balances June 30, 2016</td>
<td>$3,880</td>
<td>$7,516</td>
<td>$4,950</td>
<td>$16,346</td>
</tr>
<tr>
<td>Additions</td>
<td>0</td>
<td>9,002</td>
<td>0</td>
<td>9,002</td>
</tr>
<tr>
<td>Deletions</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Balances June 30, 2017</td>
<td>3,880</td>
<td>16,518</td>
<td>4,950</td>
<td>25,348</td>
</tr>
</tbody>
</table>

Accumulated depreciation

<table>
<thead>
<tr>
<th>Accumulated depreciation</th>
<th>Leasehold Improvements</th>
<th>Furniture Fixtures and Equipment</th>
<th>Software and Licensing</th>
<th>Total Capital Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balances June 30, 2016</td>
<td>1,940</td>
<td>5,142</td>
<td>3,378</td>
<td>10,460</td>
</tr>
<tr>
<td>Depreciation expense</td>
<td>970</td>
<td>698</td>
<td>652</td>
<td>2,320</td>
</tr>
<tr>
<td>Deletions</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Balances June 30, 2017</td>
<td>2,910</td>
<td>5,840</td>
<td>4,030</td>
<td>12,780</td>
</tr>
</tbody>
</table>

Net capital assets June 30, 2017

| Net capital assets June 30, 2017 | $970 | $10,678 | $920 | $12,568 |
(5) Employers’ Net Pension Liability
The components of the net pension liability as of June 30, 2017, are shown in the Schedule of Employers’ Net Pension Liability below.

Schedule of Employers’ Net Pension Liability

<table>
<thead>
<tr>
<th></th>
<th>MSEP</th>
<th>Judicial Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total pension liability</td>
<td>$13,152,273,895</td>
<td>$564,417,925</td>
</tr>
<tr>
<td>MOSERS fiduciary net position</td>
<td>7,945,358,298</td>
<td>137,634,941</td>
</tr>
<tr>
<td>Employers’ net pension liability</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$ 5,206,915,597</td>
<td>$426,782,984</td>
</tr>
<tr>
<td>Plan net position as a percentage of the total pension liability</td>
<td>60.41%</td>
<td>24.39%</td>
</tr>
<tr>
<td>Covered employee payroll</td>
<td>$ 1,941,969,786</td>
<td>$ 58,150,935</td>
</tr>
<tr>
<td>Employers’ net pension liability as a percentage of employee covered payroll</td>
<td>268.13%</td>
<td>733.92%</td>
</tr>
</tbody>
</table>

Actuarial valuation of an ongoing plan involves estimates of the reported amounts and assumptions about the probability of occurrence of events far into the future. Examples include assumptions about future employment mortality and future salary increases. Amounts determined regarding the net pension liability are subject to continual revision as actual results are compared with past expectations and new estimates are made about the future. The Schedule of Changes in Employers’ Net Pension Liability presents multi-year trend information about whether the plan fiduciary net positions are increasing or decreasing over time relative to the total pension liability. These schedules are presented in the Required Supplementary Information on page 51-52. The total pension liability, as of June 30, 2017, is $13,152,273,895 for MSEP and $564,417,925 for the Judicial Plan based on an actuarial valuation performed as of June 30, 2017, and a measurement date of June 30, 2017, using generally accepted actuarial procedures.

Changes to Amortization Period
In June 2013, the board approved a change to the period over which unfunded actuarial accrued liabilities are amortized to reduce the amortization period from an open 30 years to a closed 30 years beginning July 1, 2014. This will continue to reduce by one year for each subsequent annual valuation until the period reaches one year. The board intends to reexamine the amortization period in connection with the 2030 actuarial valuation to determine whether or not it should be reduced below 15 years.

The Summary of Actuarial Assumptions below applies to all periods included in the measurement of the total pension liability.

Summary of Actuarial Assumptions for MSEP & Judicial Plan

<table>
<thead>
<tr>
<th>Assumption</th>
<th>MSEP</th>
<th>Judicial Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valuation date</td>
<td>..................................................</td>
<td>June 30, 2017</td>
</tr>
<tr>
<td>Actuarial cost method</td>
<td>..........................................................</td>
<td>Entry age normal</td>
</tr>
<tr>
<td>Amortization method</td>
<td>..........................................................</td>
<td>Level percentage, closed</td>
</tr>
<tr>
<td>Remaining amortization period</td>
<td>..................................................</td>
<td>27 years for FY19 contribution rate</td>
</tr>
<tr>
<td>Asset valuation method</td>
<td>..........................................................</td>
<td>Open 5-year smoothed +25/-20% market corridor</td>
</tr>
<tr>
<td>Investment rate of return</td>
<td>..........................................................</td>
<td>7.65% effective June 30, 2016</td>
</tr>
<tr>
<td></td>
<td>..........................................................</td>
<td>7.50% effective June 30, 2017</td>
</tr>
<tr>
<td>Projected salary increases</td>
<td>..........................................................</td>
<td>3.25 – 8.75% (MSEP)</td>
</tr>
<tr>
<td></td>
<td>..........................................................</td>
<td>3.0 – 5.2% (Judicial Plan)</td>
</tr>
<tr>
<td>Rate of payroll growth</td>
<td>..........................................................</td>
<td>3.00%</td>
</tr>
<tr>
<td>COLAs</td>
<td>..........................................................</td>
<td>4.00%/2.00%*</td>
</tr>
<tr>
<td>Price inflation</td>
<td>..........................................................</td>
<td>2.50%</td>
</tr>
</tbody>
</table>

Mortality rates are based on the RP-2014 Healthy Annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 120% for the MSEP and 98% for the Judicial Plan. The preretirement mortality table used was the RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females for the MSEP.

An experience study covering the five-year period ending June 30, 2015 was performed in 2016.

* On a compound basis, 4.00% for the first 12 years, 3.06% for the 13th year, and 2.00% per year thereafter. When no minimum COLA is in effect, the annual COLA is assumed to be 2.00% (80% of the 2.50% price inflation), on a compounded basis.
The discount rate used to measure the total pension liability was 7.50%. The projection of cash flows used to determine the discount rate assumed that contributions from participating employers will be made using the actuarially determined rates. Based on those assumptions, MOSERS’ fiduciary net position was projected to be available to make all the projected future benefit payments of the current plan members. As a result, the long-term expected rate of return on pension plan investments of 7.50% was applied to all periods of projected benefit payments to determine the total pension liability.

The table below presents the net pension liability of the plans, as of June 30, 2017, calculated using the discount rate of 7.50%, as well as what the net pension liability would be if it were calculated using a discount rate that is 1% lower (6.50%) or 1% higher (8.50%) than the current rate.

### Sensitivity of Net Pension Liability to Changes in the Discount Rate

<table>
<thead>
<tr>
<th>Employers’ Net Pension Liability</th>
<th>1% Decrease (6.50%)</th>
<th>Current Discount Rate (7.50%)</th>
<th>1% Increase (8.50%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSEP</td>
<td>$6,704,024,789</td>
<td>$5,206,915,597</td>
<td>$3,947,666,258</td>
</tr>
<tr>
<td>Judicial Plan</td>
<td>484,552,509</td>
<td>426,782,984</td>
<td>377,354,336</td>
</tr>
</tbody>
</table>

The funding status of the plans and Employer Schedule of Funding Progress can be found in the Actuarial Section on page 96.

(6) Contributions and Reserves

The MSEP and the Judicial Plan are pension plans covering substantially all state of Missouri employees and judges. The state of Missouri and its component employers make required contributions to the plans. The required contributions are expressed as a level percentage of covered payroll and are actuarially determined using an individual entry-age normal actuarial cost method. Contributions began July 2014 at the contribution rate determined by the June 30, 2013 actuarial valuation (16.97% and 58.45% for MSEP and Judicial Plan, respectively) and will continue at or above that rate until the actuarial funding of the plans is at least 80%. MSEP 2011 and Judicial Plan 2011 members are required to contribute 4% of their pay. Costs of administering the plans are financed from the contributions to the pension trust funds and investment earnings.

(7) Other Post-Employment Benefits (OPEB)

In addition to the defined-benefit pension provided through MOSERS, the state of Missouri also funds, either partially or in its entirety, OPEB for eligible retirees as follows:

**Retiree Life Insurance**

Members who retire on or after October 1, 1985, are eligible for $5,000 of state-sponsored basic life insurance coverage if they retire directly from active employment. As of June 30, 2017, 25,819 retirees were participating in the program. This insured defined-benefit coverage is financed on a percentage of payroll (.115%) and is purchased as a group policy through competitive bids and is currently administered through The Standard insurance company. The cost for the year ended June 30, 2017 was $1,901,630.Premiums are contributed entirely by the state and its component employers as provided by Section 104.515, RSMo.

Retirees of the Department of Labor and Industrial Relations (DOLIR), who retired prior to January 1, 1996, are eligible for state-sponsored insured defined-benefit insurance coverage in the same amount of coverage they were receiving through the DOLIR. As of June 30, 2017, 189 retirees were participating in the program. The coverage for this closed group is purchased as a group policy through competitive bids at a current cost of $2.07 per thousand dollars of coverage, per month, per eligible participant ($23,586 for the year ended June 30, 2017). Premiums are paid entirely by the DOLIR as provided by Section 228.225, RSMo. Retirees of the DOLIR who retired on or after January 1, 1996, are eligible for $5,000 of state-sponsored life insurance coverage if they retire directly from active employment. They are included in the group described in the preceding paragraph.
Long-Term Disability Insurance (LTD)
MOSERS provides LTD coverage for eligible members and generally includes those active members of MOSERS’ retirement plans who do not have other disability coverage and are not yet eligible to receive normal (unreduced) retirement benefits. There were 33,277 members covered under the program, as of June 30, 2017. This insured defined-benefit coverage is billed on a percentage of covered payroll (0.55%). Purchased as group policy through competitive bids, LTD is administered by The Standard insurance company. The cost for the year ended June 30, 2017 was $8,137,551. Premiums are contributed by the state and its component employers as provided for by Section 104.515, RSMo.

Post-Employment Retiree Health Care
MOSERS participates in a cost-sharing multiple-employer defined-benefit post-employment health care plan administered by the Missouri Consolidated Health Care Plan (MCHCP). The plan provides medical benefits to retirees of participating governmental entities. Retirees who had medical insurance coverage for six months immediately prior to termination or state-sponsored medical coverage since the effective date of the last enrollment period (or since first eligible), before they are eligible to retire, may continue coverage into retirement.

MCHCP issues a publicly available financial report that includes Financial Statements and Required Supplementary Information for the post-employment health care plan. The report may be obtained online at www.mchcp.org or by calling (800) 487-0771 or writing to MCHCP, 832 Weathered Rock Court, P.O. Box 104355, Jefferson City, MO 65110-4355.

Plan funding requests are actuarially determined, approved by the MCHCP Board of Trustees and subject to appropriation by the Missouri General Assembly. MOSERS contributed $267,315 in FY15, $260,223 in FY16, and $275,895 in FY17 in accordance with the state’s funding policy toward the annual required contributions for post-employment retiree health care, which equaled MOSERS’ required contribution each year.

(8) Plan Termination
MOSERS and its related plans are administered in accordance with Missouri statutes. Plans can only be terminated by an amendment to these statutes by the Missouri legislature.

On April 26, 2005, Senate Bill 202 was enacted, which terminated the Administrative Law Judges and Legal Advisors’ Plan (ALJLAP) for new hires only. Under this legislation, individuals who assume a position after April 26, 2005, who would have otherwise been covered by the ALJLAP, will instead participate in the MSEP or the MSEP 2000, depending on when they initially became state employees. For fiscal years 2005 and after, all liabilities and assets of the ALJLAP were transferred and combined with the MSEP. Membership totals for the ALJLAP are included in the MSEP in all relevant sections of this report.

(9) Commitments
As of June 30, 2017, MOSERS has $326,944,831 and €868,751 unfunded commitments in the private asset class.

(10) Contingencies
MOSERS is a defendant in a lawsuit involving the GM Bankruptcy. The trustee for the bankruptcy paid MOSERS $500,047 based on the assumption that it was a secured debt owed to MOSERS. It appears that the loan administrator released the security interest prior to the payment being made by the trustee. MOSERS and the other investors who received similar payments have been sued in the bankruptcy case on the theory that we were unsecured creditors who improperly received payments. MOSERS is being represented by a firm that is also representing a number of similarly situated defendants. Our group has filed a cross claim against JP Morgan and is currently engaged in that litigation.

(11) Risk Management
MOSERS is exposed to various risks of loss related to natural disasters, error, and omissions, loss of assets, torts, etc. MOSERS has chosen to cover such losses through the purchase of commercial insurance to help mitigate some of the exposure to those risks. There have been no material insurance claims filed or paid during the past three years.
Pension Trust Funds
Schedule of Changes in Employers’ Net Pension Liability | For Years Ended June 30, 2014–2017*

MSEP

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total pension liability</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service cost</td>
<td>$158,116,026</td>
<td>$150,412,577</td>
<td>$149,021,755</td>
<td>$152,766,134</td>
</tr>
<tr>
<td>Interest on the total pension liability</td>
<td>869,878,195</td>
<td>896,451,618</td>
<td>913,877,923</td>
<td>945,654,398</td>
</tr>
<tr>
<td>Benefit changes</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>(1,696,059)</td>
</tr>
<tr>
<td>Difference between expected and actual experience</td>
<td>12,376,237</td>
<td>(27,983,267)</td>
<td>61,150,083</td>
<td>(104,203,260)</td>
</tr>
<tr>
<td>Assumption changes</td>
<td>0</td>
<td>(57,568,553)</td>
<td>656,805,085</td>
<td>202,554,786</td>
</tr>
<tr>
<td>Benefit payments and member refunds</td>
<td>(680,436,107)</td>
<td>(728,265,800)</td>
<td>(757,310,503)</td>
<td>(793,964,857)</td>
</tr>
<tr>
<td>Net change in total pension liability</td>
<td>359,934,351</td>
<td>233,046,575</td>
<td>1,023,544,343</td>
<td>401,111,142</td>
</tr>
<tr>
<td>Total pension liability - beginning</td>
<td>11,134,637,484</td>
<td>11,494,571,835</td>
<td>11,727,618,410</td>
<td>12,751,162,753</td>
</tr>
<tr>
<td>Total pension liability - ending (a)</td>
<td>$11,494,571,835</td>
<td>$11,727,618,410</td>
<td>$12,751,162,753</td>
<td>$13,152,273,895</td>
</tr>
<tr>
<td>Plan fiduciary net position</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employer contributions</td>
<td>$326,370,336</td>
<td>$329,752,832</td>
<td>$329,957,369</td>
<td>$335,217,422</td>
</tr>
<tr>
<td>Employee contributions</td>
<td>14,025,328</td>
<td>18,099,455</td>
<td>21,684,920</td>
<td>25,439,343</td>
</tr>
<tr>
<td>Pension plan net investment income (loss)</td>
<td>1,193,952,121</td>
<td>(237,070,529)</td>
<td>1,740,269</td>
<td>272,595,668</td>
</tr>
<tr>
<td>Benefit payments and member refunds</td>
<td>(680,436,107)</td>
<td>(728,265,800)</td>
<td>(757,310,503)</td>
<td>(793,964,857)</td>
</tr>
<tr>
<td>Pension plan administrative expense</td>
<td>(7,336,922)</td>
<td>(8,077,692)</td>
<td>(8,489,375)</td>
<td>(8,759,341)</td>
</tr>
<tr>
<td>Other</td>
<td>296,369,500</td>
<td>5,434,820</td>
<td>4,923,622</td>
<td>5,668,849</td>
</tr>
<tr>
<td>Net change in plan fiduciary net position</td>
<td>1,142,944,256</td>
<td>(620,126,914)</td>
<td>(407,493,698)</td>
<td>(163,802,916)</td>
</tr>
<tr>
<td>Plan fiduciary net position - beginning</td>
<td>7,993,837,570</td>
<td>9,136,781,826</td>
<td>8,516,654,912</td>
<td>8,109,161,214</td>
</tr>
<tr>
<td>Plan fiduciary net position - ending (b)</td>
<td>9,136,781,826</td>
<td>8,516,654,912</td>
<td>8,109,161,214</td>
<td>7,945,358,298</td>
</tr>
<tr>
<td>Net pension liability - ending (a)-(b)</td>
<td>$2,357,790,009</td>
<td>$3,210,963,498</td>
<td>$4,642,001,539</td>
<td>$5,206,915,597</td>
</tr>
<tr>
<td>Plan fiduciary net position as a percentage of total pension liability</td>
<td>79.49%</td>
<td>72.62%</td>
<td>63.60%</td>
<td>60.41%</td>
</tr>
<tr>
<td>Covered employee payroll</td>
<td>$1,902,719,928</td>
<td>$1,918,527,768</td>
<td>$1,921,528,936</td>
<td>$1,941,969,786</td>
</tr>
<tr>
<td>Net pension liability as a percentage of covered employee payroll</td>
<td>123.92%</td>
<td>167.37%</td>
<td>241.58%</td>
<td>268.13%</td>
</tr>
</tbody>
</table>

* Schedule is intended to show information for 10 years. Data for additional years will be displayed as it becomes available.
### Pension Trust Funds

#### Schedule of Changes in Employers’ Net Pension Liability | For Years Ended June 30, 2014–2017*

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total pension liability</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service cost</td>
<td>$8,990,293</td>
<td>$10,613,686</td>
<td>$10,932,097</td>
<td>$12,945,567</td>
</tr>
<tr>
<td>Interest on the total pension liability</td>
<td>34,013,615</td>
<td>36,161,612</td>
<td>37,755,240</td>
<td>40,617,091</td>
</tr>
<tr>
<td>Benefit changes</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Difference between expected and actual experience</td>
<td>13,360,614</td>
<td>5,103,664</td>
<td>(5,036,696)</td>
<td>(10,687,091)</td>
</tr>
<tr>
<td>Assumption changes</td>
<td>0</td>
<td>0</td>
<td>53,991,379</td>
<td>7,905,466</td>
</tr>
<tr>
<td>Benefit payments including member refunds</td>
<td>(29,406,625)</td>
<td>(31,245,906)</td>
<td>(32,989,714)</td>
<td>(33,984,725)</td>
</tr>
<tr>
<td><strong>Total pension liability - beginning</strong></td>
<td>435,378,358</td>
<td>462,336,255</td>
<td>482,969,311</td>
<td>547,621,617</td>
</tr>
<tr>
<td><strong>Total pension liability - ending (a)</strong></td>
<td>$462,336,255</td>
<td>$482,969,311</td>
<td>$547,621,617</td>
<td>$564,417,925</td>
</tr>
<tr>
<td><strong>Plan fiduciary net position</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employer contributions</td>
<td>$29,264,877</td>
<td>$32,696,686</td>
<td>$33,642,498</td>
<td>$34,246,826</td>
</tr>
<tr>
<td>Employee contributions</td>
<td>294,810</td>
<td>488,193</td>
<td>661,206</td>
<td>786,745</td>
</tr>
<tr>
<td>Pension plan net investment income (loss)</td>
<td>17,199,701</td>
<td>(3,610,352)</td>
<td>28,081</td>
<td>4,680,131</td>
</tr>
<tr>
<td>Benefit payments including member refunds</td>
<td>(29,406,625)</td>
<td>(31,245,906)</td>
<td>(32,979,706)</td>
<td>(33,984,725)</td>
</tr>
<tr>
<td>Pension plan administrative expense</td>
<td>(105,693)</td>
<td>(123,015)</td>
<td>(136,983)</td>
<td>(150,387)</td>
</tr>
<tr>
<td>Other</td>
<td>4,195,049</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Net change in plan fiduciary net position</strong></td>
<td>21,442,119</td>
<td>(1,794,394)</td>
<td>1,205,088</td>
<td>5,578,590</td>
</tr>
<tr>
<td><strong>Plan fiduciary net position - beginning</strong></td>
<td>111,203,538</td>
<td>132,645,657</td>
<td>130,851,263</td>
<td>132,056,351</td>
</tr>
<tr>
<td><strong>Plan fiduciary net position - ending (b)</strong></td>
<td>132,645,657</td>
<td>130,851,263</td>
<td>132,056,351</td>
<td>137,634,941</td>
</tr>
<tr>
<td><strong>Net pension liability - ending (a)-(b)</strong></td>
<td>$329,690,598</td>
<td>$352,118,048</td>
<td>$415,565,266</td>
<td>$426,782,984</td>
</tr>
<tr>
<td><strong>Plan fiduciary net position as a percentage of total pension liability</strong></td>
<td>28.69%</td>
<td>27.09%</td>
<td>24.11%</td>
<td>24.39%</td>
</tr>
<tr>
<td><strong>Covered employee payroll</strong></td>
<td>$49,587,936</td>
<td>$55,656,457</td>
<td>$57,421,016</td>
<td>$58,150,935</td>
</tr>
<tr>
<td><strong>Net pension liability as a percentage of covered employee payroll</strong></td>
<td>664.86%</td>
<td>632.66%</td>
<td>723.72%</td>
<td>733.92%</td>
</tr>
</tbody>
</table>

* Schedule is intended to show information for 10 years. Data for additional years will be displayed as it becomes available.
REQUIRED SUPPLEMENTARY INFORMATION

Pension Trust Funds

Schedule of Employer Contributions | Last Ten Years

### MSEP

<table>
<thead>
<tr>
<th>Year Ended June 30</th>
<th>Actuarially Determined Contribution</th>
<th>Contributions in Relation to the Actuarially Determined Contribution**</th>
<th>Contribution Deficiency (Excess)</th>
<th>Covered Employee Payroll</th>
<th>Contributions as a Percentage of Covered Payroll*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>$249,770,156</td>
<td>$249,770,156</td>
<td>$0</td>
<td>$1,916,527,398</td>
<td>13.0%</td>
</tr>
<tr>
<td>2009</td>
<td>252,105,008</td>
<td>252,105,008</td>
<td>0</td>
<td>2,002,402,087</td>
<td>12.6</td>
</tr>
<tr>
<td>2010</td>
<td>251,226,187</td>
<td>251,226,187</td>
<td>0</td>
<td>1,945,095,321</td>
<td>12.9</td>
</tr>
<tr>
<td>2011</td>
<td>263,418,048</td>
<td>263,418,048</td>
<td>0</td>
<td>1,875,569,816</td>
<td>14.0</td>
</tr>
<tr>
<td>2012</td>
<td>263,373,924</td>
<td>263,373,924</td>
<td>0</td>
<td>1,864,069,493</td>
<td>14.1</td>
</tr>
<tr>
<td>2013</td>
<td>274,655,284</td>
<td>274,655,284</td>
<td>0</td>
<td>1,880,212,950</td>
<td>14.6</td>
</tr>
<tr>
<td>2014</td>
<td>326,370,336</td>
<td>326,370,336</td>
<td>0</td>
<td>1,902,719,928</td>
<td>17.2</td>
</tr>
<tr>
<td>2015</td>
<td>329,752,832</td>
<td>329,752,832</td>
<td>0</td>
<td>1,918,527,768</td>
<td>17.2</td>
</tr>
<tr>
<td>2016</td>
<td>329,957,369</td>
<td>329,957,369</td>
<td>0</td>
<td>1,921,528,936</td>
<td>17.2</td>
</tr>
<tr>
<td>2017</td>
<td>322,772,697</td>
<td>335,217,422</td>
<td>(12,444,725)</td>
<td>1,941,969,786</td>
<td>17.3</td>
</tr>
</tbody>
</table>

* Actuarial contribution rate shown is the actual employer contribution made divided by payroll in force on May 31 reported for valuation. This rate as computed may vary from the board’s certified employer contribution rate due to the fluctuations in membership and pay during the year.

** Since the percent of payroll contribution rate was applied to pension payroll during the fiscal year, the actuarially determined contribution is equal to the actual contribution.

### Judicial Plan

<table>
<thead>
<tr>
<th>Year Ended June 30</th>
<th>Actuarially Determined Contribution</th>
<th>Contributions in Relation to the Actuarially Determined Contribution**</th>
<th>Contribution Deficiency (Excess)</th>
<th>Covered Employee Payroll</th>
<th>Contributions as a Percentage of Covered Payroll*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>$26,215,309</td>
<td>$26,215,309</td>
<td>0</td>
<td>$44,542,530</td>
<td>58.9%</td>
</tr>
<tr>
<td>2009</td>
<td>27,725,882</td>
<td>27,725,882</td>
<td>0</td>
<td>45,505,512</td>
<td>60.9</td>
</tr>
<tr>
<td>2010</td>
<td>27,029,198</td>
<td>27,029,198</td>
<td>0</td>
<td>46,112,730</td>
<td>58.6</td>
</tr>
<tr>
<td>2011</td>
<td>27,702,682</td>
<td>27,702,682</td>
<td>0</td>
<td>45,888,020</td>
<td>60.4</td>
</tr>
<tr>
<td>2012</td>
<td>26,324,526</td>
<td>26,324,526</td>
<td>0</td>
<td>45,835,501</td>
<td>57.4</td>
</tr>
<tr>
<td>2013</td>
<td>28,330,649</td>
<td>28,330,649</td>
<td>0</td>
<td>48,697,726</td>
<td>58.2</td>
</tr>
<tr>
<td>2014</td>
<td>29,264,877</td>
<td>29,264,877</td>
<td>0</td>
<td>49,587,936</td>
<td>59.0</td>
</tr>
<tr>
<td>2015</td>
<td>32,696,686</td>
<td>32,696,686</td>
<td>0</td>
<td>55,656,457</td>
<td>58.7</td>
</tr>
<tr>
<td>2016</td>
<td>33,642,498</td>
<td>33,642,498</td>
<td>0</td>
<td>57,421,016</td>
<td>58.6</td>
</tr>
<tr>
<td>2017</td>
<td>32,670,710</td>
<td>34,246,826</td>
<td>(1,576,116)</td>
<td>58,150,935</td>
<td>58.9</td>
</tr>
</tbody>
</table>
REQUIRED SUPPLEMENTARY INFORMATION

Pension Trust Funds

Schedule of Annual Money-Weighted Rate of Return on Investments*

<table>
<thead>
<tr>
<th>Year Ended June 30</th>
<th>Annual Money-Weighted Rate of Return — Net of Investment Expense</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>19.25%</td>
</tr>
<tr>
<td>2015</td>
<td>(2.60)</td>
</tr>
<tr>
<td>2016</td>
<td>0.08</td>
</tr>
<tr>
<td>2017</td>
<td>3.51</td>
</tr>
</tbody>
</table>

* Schedule is intended to show information for 10 years. Data for additional years will be displayed as it becomes available.
REQUIRED SUPPLEMENTARY INFORMATION

Pension Trust Funds

Notes to the Schedules of Required Supplementary Information | Last Ten Years

Actuarial Methods and Assumptions for Valuations Performed as of June 30, 2017

The entry-age actuarial cost method of valuation is used in determining liabilities and normal cost. Regular actuarial valuations provide valuable information about the composite change in the unfunded actuarial accrued liabilities (whether or not the liabilities are increasing or decreasing, and by how much). Since the future cannot be predicted with precision, actual experience is expected to differ from assumed experience. Differences occurring in the past between assumed experience and actual experience (actuarial gains and losses) become part of actuarial accrued liabilities. Unfunded actuarial accrued liabilities are amortized to produce payments (principal and interest), which are expressed as a percent of payroll. A closed 27-year amortization period was used for the June 30, 2017 valuations to determine the FY19 contribution rates. The actuarial value of assets is based on a method that fully recognizes expected investment returns and averages unanticipated market returns over a 5-year period. The corridor limit is currently 80% to 125%.

The investment return rate assumption was reduced from 7.65% as of June 30, 2016, to 7.50% per year as of June 30, 2017, compounded annually (net of investment expenses). The price inflation assumption used was 2.5% per year. Projected salary assumptions were 3.25% to 8.75% for MSEP and 3.0% to 5.2% for the Judicial Plan. The assumption used for annual post-retirement benefit increases (COLAs) is 4.0% (on a compound basis) when a minimum COLA is in effect. When no minimum COLA is in effect, the annual COLA is assumed to be 2.00% (80% of the 2.50% price inflation), on a compounded basis.

2008

The actuarial valuations, as of June 30, 2008, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2010.

<table>
<thead>
<tr>
<th></th>
<th>Amount</th>
<th>Percent of Payroll</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSEP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in benefit assumptions or methods</td>
<td>$4,791,318</td>
<td>0.25%</td>
</tr>
<tr>
<td>Experience and nonrecurring items</td>
<td>(574,958)</td>
<td>(0.03)</td>
</tr>
<tr>
<td>Judicial Plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in benefit assumptions or methods</td>
<td>(547,873)</td>
<td>(1.23)</td>
</tr>
<tr>
<td>Experience and nonrecurring items</td>
<td>(160,353)</td>
<td>(0.36)</td>
</tr>
</tbody>
</table>

2009

The actuarial valuations, as of June 30, 2009, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2011.

<table>
<thead>
<tr>
<th></th>
<th>Amount</th>
<th>Percent of Payroll</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSEP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>State of Missouri general pay freeze</td>
<td>$ (4,405,285)</td>
<td>(0.22)%</td>
</tr>
<tr>
<td>Experience and nonrecurring items</td>
<td>55,466,538</td>
<td>2.77</td>
</tr>
<tr>
<td>Change in valuation asset corridor from +/- 20% to +/- 30%</td>
<td>(29,835,791)</td>
<td>(1.49)</td>
</tr>
<tr>
<td>Judicial Plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>State of Missouri general pay freeze</td>
<td>350,392</td>
<td>0.77</td>
</tr>
<tr>
<td>Experience and nonrecurring items</td>
<td>496,010</td>
<td>1.09</td>
</tr>
<tr>
<td>Change in valuation asset corridor from +/- 20% to +/- 30%</td>
<td>(141,067)</td>
<td>(0.31)</td>
</tr>
</tbody>
</table>
The actuarial valuations, as of June 30, 2010, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2012.

<table>
<thead>
<tr>
<th></th>
<th>Amount</th>
<th>Percent of Payroll</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MSEP</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State of Missouri general pay freeze</td>
<td>$(2,528,624)</td>
<td>(0.13)%</td>
</tr>
<tr>
<td>Addition of new tier of benefits effective January 1, 2011</td>
<td>$(17,311,348)</td>
<td>(0.89)</td>
</tr>
<tr>
<td>Experience and nonrecurring items</td>
<td>$25,480,749</td>
<td>1.31</td>
</tr>
<tr>
<td>Change in timing of contributions</td>
<td>$(2,528,624)</td>
<td>(0.13)</td>
</tr>
<tr>
<td><strong>Judicial Plan</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State of Missouri general pay freeze</td>
<td>$(308,955)</td>
<td>(0.67)</td>
</tr>
<tr>
<td>Addition of new tier of benefits effective January 1, 2011</td>
<td>$(493,406)</td>
<td>(1.07)</td>
</tr>
<tr>
<td>Experience and nonrecurring items</td>
<td>$438,071</td>
<td>0.95</td>
</tr>
<tr>
<td>Change in timing of contributions</td>
<td>$(894,587)</td>
<td>(1.94)</td>
</tr>
</tbody>
</table>

The actuarial valuations, as of June 30, 2011, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2013.

<table>
<thead>
<tr>
<th></th>
<th>Amount</th>
<th>Percent of Payroll</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MSEP</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State of Missouri general pay freeze</td>
<td>$(6,376,937)</td>
<td>(0.34)%</td>
</tr>
<tr>
<td>Experience and nonrecurring items</td>
<td>$17,630,356</td>
<td>0.94</td>
</tr>
<tr>
<td>Change in normal cost due to increasing population in MSEP 2011</td>
<td>$(2,250,684)</td>
<td>(0.12)</td>
</tr>
<tr>
<td><strong>Judicial Plan</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State of Missouri general pay freeze</td>
<td>$(293,683)</td>
<td>(0.64)</td>
</tr>
<tr>
<td>Experience and nonrecurring items</td>
<td>$289,095</td>
<td>0.63</td>
</tr>
<tr>
<td>Change in normal cost due to increasing population in Judicial Plan 2011</td>
<td>$(169,786)</td>
<td>(0.37)</td>
</tr>
</tbody>
</table>

The actuarial valuations, as of June 30, 2012, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2014.

<table>
<thead>
<tr>
<th></th>
<th>Amount</th>
<th>Percent of Payroll</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MSEP</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in assumptions or methods</td>
<td>$21,623,206</td>
<td>1.16%</td>
</tr>
<tr>
<td>Experience and nonrecurring items</td>
<td>$25,537,752</td>
<td>1.37</td>
</tr>
<tr>
<td><strong>Judicial Plan</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in assumptions or methods</td>
<td>$948,795</td>
<td>2.07</td>
</tr>
<tr>
<td>Experience and nonrecurring items</td>
<td>$320,849</td>
<td>0.70</td>
</tr>
</tbody>
</table>
The actuarial valuations, as of June 30, 2013, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2015.

<table>
<thead>
<tr>
<th>Plan</th>
<th>Amount</th>
<th>Percent of Payroll</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MSEP</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in benefit assumptions or methods</td>
<td>$18,990,151</td>
<td>1.01%</td>
</tr>
<tr>
<td>Experience and nonrecurring items</td>
<td>(376,043)</td>
<td>(0.02)</td>
</tr>
<tr>
<td><strong>Judicial Plan</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in benefit assumptions or methods</td>
<td>(603,852)</td>
<td>(1.24)</td>
</tr>
</tbody>
</table>

The actuarial valuations, as of June 30, 2014, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2016.

<table>
<thead>
<tr>
<th>Plan</th>
<th>Amount</th>
<th>Percent of Payroll</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MSEP</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recognition of asset gains</td>
<td>$16,173,119</td>
<td>0.85%</td>
</tr>
<tr>
<td>Experience and nonrecurring items</td>
<td>(1,141,632)</td>
<td>(0.06)</td>
</tr>
<tr>
<td>Change in normal cost due to increasing population in MSEP 2011 and experience</td>
<td>4,376,256</td>
<td>0.23</td>
</tr>
<tr>
<td><strong>Judicial Plan</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in normal cost due to increasing population in Judicial Plan 2011 and experience</td>
<td>(510,756)</td>
<td>(1.03)</td>
</tr>
<tr>
<td>Anticipated change in salary levels</td>
<td>(1,180,193)</td>
<td>(2.38)</td>
</tr>
</tbody>
</table>

The actuarial valuations, as of June 30, 2015, reflected the following changes to the computed actuarially determined contribution (ADC) rates for fiscal year ended June 30, 2017. Actual contribution rate differs from computed ADC due to minimum funding policy adopted by the board in September 2014, requiring contributions to be no less than 16.97% of covered payroll for MSEP and 58.45% for Judicial Plan until the funding ratio is at least 80% for each plan.

<table>
<thead>
<tr>
<th>Plan</th>
<th>Amount</th>
<th>Percent of Payroll</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MSEP</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recognition of asset losses</td>
<td>$7,674,111</td>
<td>0.40%</td>
</tr>
<tr>
<td>Experience and nonrecurring items</td>
<td>4,412,614</td>
<td>0.23</td>
</tr>
<tr>
<td>Change in normal cost due to increasing population in MSEP 2011 and experience</td>
<td>(4,604,467)</td>
<td>(0.24)</td>
</tr>
<tr>
<td>Liability (gain) loss</td>
<td>(1,918,528)</td>
<td>(0.10)</td>
</tr>
<tr>
<td>Change in benefit assumptions or methods</td>
<td>3,069,644</td>
<td>0.16</td>
</tr>
<tr>
<td>Minimum funding policy contribution</td>
<td>(1,151,117)</td>
<td>(0.06)</td>
</tr>
<tr>
<td><strong>Judicial Plan</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recognition of asset losses</td>
<td>116,879</td>
<td>0.21</td>
</tr>
<tr>
<td>Experience and nonrecurring items</td>
<td>417,423</td>
<td>0.75</td>
</tr>
<tr>
<td>Change in normal cost due to increasing population in Judicial Plan 2011 and experience</td>
<td>(372,898)</td>
<td>(0.67)</td>
</tr>
<tr>
<td>Liability (gain) loss</td>
<td>361,767</td>
<td>0.65</td>
</tr>
<tr>
<td>Minimum funding policy contribution</td>
<td>(122,444)</td>
<td>(0.22)</td>
</tr>
</tbody>
</table>
2016  The actuarial valuations, as of June 30, 2016, reflected the following changes to the computed actuarially determined contribution (ADC) rates for fiscal year ended June 30, 2018.

<table>
<thead>
<tr>
<th></th>
<th>Amount</th>
<th>Percent of Payroll</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MSEP</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recognition of asset losses</td>
<td>$ 21,136,818</td>
<td>1.10%</td>
</tr>
<tr>
<td>Change in normal cost due to increasing population in MSEP 2011 and experience</td>
<td>(3,843,058)</td>
<td>(0.20)</td>
</tr>
<tr>
<td>Liability (gain) loss</td>
<td>3,843,058</td>
<td>0.20</td>
</tr>
<tr>
<td>Projected payroll higher than expected</td>
<td>(192,153)</td>
<td>(0.01)</td>
</tr>
<tr>
<td>Change in benefit assumptions or methods</td>
<td>39,583,496</td>
<td>2.06</td>
</tr>
<tr>
<td>Minimum funding policy contribution</td>
<td>(768,612)</td>
<td>(0.04)</td>
</tr>
<tr>
<td><strong>Judicial Plan</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recognition of asset losses</td>
<td>9,415,492</td>
<td>0.49</td>
</tr>
<tr>
<td>Experience and nonrecurring items</td>
<td>(13,258,550)</td>
<td>(0.69)</td>
</tr>
<tr>
<td>Change in benefit assumptions or methods</td>
<td>130,856,121</td>
<td>6.81</td>
</tr>
<tr>
<td>Change in normal cost due to increasing population in Judicial 2011 and experience</td>
<td>(1,345,070)</td>
<td>(0.07)</td>
</tr>
<tr>
<td>Minimum funding policy contribution</td>
<td>(4,035,211)</td>
<td>(0.21)</td>
</tr>
</tbody>
</table>

2017  The actuarial valuations, as of June 30, 2017, reflected the following changes to the computed actuarially determined contribution (ADC) rates for fiscal year ended June 30, 2019.

<table>
<thead>
<tr>
<th></th>
<th>Amount</th>
<th>Percent of Payroll</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MSEP</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recognition of asset losses</td>
<td>$ 14,758,970</td>
<td>0.76%</td>
</tr>
<tr>
<td>Recognition of liability gains</td>
<td>(1,359,379)</td>
<td>(0.07)</td>
</tr>
<tr>
<td>Change in benefit assumptions or methods</td>
<td>13,982,182</td>
<td>0.72</td>
</tr>
<tr>
<td>Projected payroll lower than expected</td>
<td>970,985</td>
<td>0.05</td>
</tr>
<tr>
<td>Minimum funding policy contribution</td>
<td>(776,788)</td>
<td>(0.04)</td>
</tr>
<tr>
<td>Normal cost</td>
<td>(2,524,561)</td>
<td>(0.13)</td>
</tr>
<tr>
<td>Change in effective employee contribution rate</td>
<td>1,359,379</td>
<td>0.07</td>
</tr>
<tr>
<td>Transition/actuarial software</td>
<td>(12,622,804)</td>
<td>(0.65)</td>
</tr>
<tr>
<td>Experience and nonrecurring items</td>
<td>970,985</td>
<td>0.04</td>
</tr>
<tr>
<td><strong>Judicial Plan</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recognition of asset losses</td>
<td>226,789</td>
<td>0.39</td>
</tr>
<tr>
<td>Recognition of liability gains</td>
<td>(122,117)</td>
<td>(0.21)</td>
</tr>
<tr>
<td>Change in benefit assumptions or methods</td>
<td>453,577</td>
<td>0.78</td>
</tr>
<tr>
<td>Projected payroll lower than expected</td>
<td>343,091</td>
<td>0.59</td>
</tr>
<tr>
<td>Minimum funding policy contribution</td>
<td>(104,672)</td>
<td>(0.18)</td>
</tr>
<tr>
<td>Normal cost</td>
<td>(360,536)</td>
<td>(0.62)</td>
</tr>
<tr>
<td>Change in effective employee contribution rate</td>
<td>58,151</td>
<td>0.10</td>
</tr>
<tr>
<td>Transition/actuarial software</td>
<td>186,083</td>
<td>0.32</td>
</tr>
<tr>
<td>Other experience</td>
<td>261,679</td>
<td>0.45</td>
</tr>
</tbody>
</table>
### ADDITIONAL FINANCIAL INFORMATION

**Pension Trust Funds**

**Schedules of Investment Expenses**

<table>
<thead>
<tr>
<th>Investing Activity</th>
<th>MSEP</th>
<th>Judicial Plan</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Investment management and administrative fees</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actis Emerging Markets III &amp; IV – private equity</td>
<td>$1,314,433</td>
<td>$22,567</td>
<td>$1,337,000</td>
</tr>
<tr>
<td>African Development Partners I &amp; II, LLC – private equity</td>
<td>6,882,599</td>
<td>118,166</td>
<td>7,000,765</td>
</tr>
<tr>
<td>Alinda Infrastructure Fund I, LP – private equity</td>
<td>248,137</td>
<td>4,260</td>
<td>252,397</td>
</tr>
<tr>
<td>American Industrial Partners V &amp; VI – private equity</td>
<td>1,098,253</td>
<td>18,856</td>
<td>1,117,109</td>
</tr>
<tr>
<td>AQR DELTA Sapphire Fund, LP – hedge funds</td>
<td>3,788,947</td>
<td>65,052</td>
<td>3,853,999</td>
</tr>
<tr>
<td>AQR Global Risk Premium Fund IV, LP – beta-balanced</td>
<td>2,491,944</td>
<td>42,784</td>
<td>2,534,728</td>
</tr>
<tr>
<td>AQR Style Premia Fund, LP – hedge funds</td>
<td>(256,555)</td>
<td>(4,045)</td>
<td>(260,600)</td>
</tr>
<tr>
<td>Astenbeck Capital – beta-balanced</td>
<td>14,440,025</td>
<td>247,917</td>
<td>14,687,942</td>
</tr>
<tr>
<td>Axiom Asia Private Capital Fund II &amp; III, LP – private equity</td>
<td>1,403,226</td>
<td>24,092</td>
<td>1,427,318</td>
</tr>
<tr>
<td>Axxon Brazil Private Equity Fund II B – private equity</td>
<td>211,187</td>
<td>3,626</td>
<td>214,813</td>
</tr>
<tr>
<td>Bayview Opportunity Domestic, LP – high yield</td>
<td>409,936</td>
<td>7,038</td>
<td>416,974</td>
</tr>
<tr>
<td>Bayview Opportunity Domestic III b, LP – real estate</td>
<td>1,978,399</td>
<td>33,967</td>
<td>2,012,366</td>
</tr>
<tr>
<td>BlackRock Financial Management Bank Loans – high yield</td>
<td>837</td>
<td>14</td>
<td>851</td>
</tr>
<tr>
<td>Blackstone Real Estate Partners IV, V, VI, &amp; VII – real estate</td>
<td>5,161,290</td>
<td>88,613</td>
<td>5,249,903</td>
</tr>
<tr>
<td>Blackstone Topaz Fund, LP – hedge funds</td>
<td>3,024,740</td>
<td>51,931</td>
<td>3,076,671</td>
</tr>
<tr>
<td>Blakeney Onyx, LP – emerging markets</td>
<td>1,223,100</td>
<td>20,999</td>
<td>1,244,099</td>
</tr>
<tr>
<td>Bridgewater Associates Diamond Ridge Fund, LLC – hedge funds</td>
<td>3,518,197</td>
<td>60,403</td>
<td>3,578,600</td>
</tr>
<tr>
<td>Bridgewater All Weather, LLC – beta-balanced</td>
<td>2,088,540</td>
<td>35,858</td>
<td>2,124,398</td>
</tr>
<tr>
<td>CarVal Investors CVI Global Value Fund A, LP – real estate</td>
<td>110,293</td>
<td>1,894</td>
<td>112,187</td>
</tr>
<tr>
<td>CarVal Investors CVI Global Value Fund A, LP – private debt</td>
<td>110,293</td>
<td>1,894</td>
<td>112,187</td>
</tr>
<tr>
<td>Castlelake Aviation II – private equity</td>
<td>392,299</td>
<td>6,735</td>
<td>399,034</td>
</tr>
<tr>
<td>Catalyst Fund III, IV &amp; V, LP – private debt</td>
<td>6,392,392</td>
<td>109,749</td>
<td>6,502,141</td>
</tr>
<tr>
<td>Catterton Partners V, VI, &amp; VII, LP – private equity</td>
<td>939,157</td>
<td>16,124</td>
<td>955,281</td>
</tr>
<tr>
<td>Cornwall Domestic, LP – hedge funds</td>
<td>1,039,537</td>
<td>17,848</td>
<td>1,057,385</td>
</tr>
<tr>
<td>Davidson Kempner Institutional Partners, LP – hedge funds</td>
<td>673,926</td>
<td>11,570</td>
<td>685,496</td>
</tr>
<tr>
<td>DRI Capital LSRC – private equity</td>
<td>719,803</td>
<td>12,358</td>
<td>732,161</td>
</tr>
<tr>
<td>EIG Energy Fund XIV, XV, &amp; XVI, LP – private equity</td>
<td>2,310,943</td>
<td>39,676</td>
<td>2,350,619</td>
</tr>
<tr>
<td>Elliott International, Ltd. – hedge funds</td>
<td>7,645,014</td>
<td>131,255</td>
<td>7,776,269</td>
</tr>
<tr>
<td>Farallon Capital Institutional Partners, LP – hedge funds</td>
<td>56,597</td>
<td>972</td>
<td>57,569</td>
</tr>
<tr>
<td>Gaoling Fund, LP – hedge funds</td>
<td>7,126,563</td>
<td>122,354</td>
<td>7,248,917</td>
</tr>
<tr>
<td>Garner Sky Investors Company, Ltd. – timber</td>
<td>2,578,521</td>
<td>44,270</td>
<td>2,622,791</td>
</tr>
<tr>
<td>Gateway Energy &amp; Resource Holdings, LLC – real estate</td>
<td>375,998</td>
<td>6,455</td>
<td>382,453</td>
</tr>
<tr>
<td>GCM Equity Partners &amp; Glenview</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital Opportunity Fund, LP – hedge funds</td>
<td>544,687</td>
<td>9,352</td>
<td>554,039</td>
</tr>
<tr>
<td>Global Forest Partners GTI7 Institutional Investors Company Ltd. – timber</td>
<td>579,316</td>
<td>9,946</td>
<td>589,262</td>
</tr>
<tr>
<td>Harvest Fund Advisors – real estate</td>
<td>703,651</td>
<td>12,081</td>
<td>715,732</td>
</tr>
<tr>
<td>HBK Merger Strategies Offshore Fund, Ltd. – hedge funds</td>
<td>3,207,556</td>
<td>55,070</td>
<td>3,262,626</td>
</tr>
<tr>
<td>JLL Partners V &amp; VI, LP – private equity</td>
<td>3,777,109</td>
<td>64,848</td>
<td>3,841,957</td>
</tr>
<tr>
<td>King Street Capital, LP – hedge funds</td>
<td>81,538</td>
<td>1,400</td>
<td>82,938</td>
</tr>
<tr>
<td>Linden Capital Partners II &amp; Linden – Co-investment I – private equity</td>
<td>3,654,416</td>
<td>62,742</td>
<td>3,717,158</td>
</tr>
<tr>
<td>Mast Credit Opportunities I, LP – hedge funds</td>
<td>816,934</td>
<td>14,026</td>
<td>830,960</td>
</tr>
<tr>
<td>MHR Institutional Partners IIA, III &amp; IV LP – private debt</td>
<td>5,044,016</td>
<td>86,600</td>
<td>5,130,616</td>
</tr>
<tr>
<td>Millennium Technology Value Partners II, LP – private equity</td>
<td>725,355</td>
<td>12,453</td>
<td>737,808</td>
</tr>
<tr>
<td>New Mountain Partners III, LP – private equity</td>
<td>4,132,505</td>
<td>70,950</td>
<td>4,203,455</td>
</tr>
<tr>
<td>NISA Investment Advisors, LLC – beta-balanced</td>
<td>4,687,062</td>
<td>80,471</td>
<td>4,767,533</td>
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</table>

*Schedule of Investment Expenses continued on page 60*
### Schedule of Investment Expenses continued from page 59

<table>
<thead>
<tr>
<th>Investing Activity</th>
<th>MSEP</th>
<th>Judicial Plan</th>
<th>Total</th>
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<tbody>
<tr>
<td>OCM Real Estate Opportunities Fund III, LP – real estate</td>
<td>(75,706)</td>
<td>(1,300)</td>
<td>(77,006)</td>
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<tr>
<td>OCM Opportunities Fund IV b, VII b &amp; VIII b, LP – private debt</td>
<td>271,278</td>
<td>4,658</td>
<td>275,936</td>
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<tr>
<td>OCM/GFI Power Opportunities Fund II &amp; III, LP – private equity</td>
<td>1,244,038</td>
<td>21,359</td>
<td>1,265,397</td>
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<tr>
<td>Perry Partners – hedge funds</td>
<td>505</td>
<td>9</td>
<td>514</td>
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<td>Pharo Macro Fund, Ltd. – hedge funds</td>
<td>6,691,588</td>
<td>114,886</td>
<td>6,806,474</td>
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<tr>
<td>Resource Management Service Wildwood Timberlands, LLC – timber</td>
<td>958,531</td>
<td>16,457</td>
<td>974,988</td>
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<tr>
<td>Silchester International Investors – int’l developed equity</td>
<td>4,542,856</td>
<td>77,995</td>
<td>4,620,851</td>
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<tr>
<td>Silver Creek Special Opportunities Fund I &amp; II – private equity</td>
<td>63,600</td>
<td>1,092</td>
<td>64,692</td>
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<tr>
<td>Silver Lake Partners II, LP – private equity</td>
<td>(201,751)</td>
<td>(3,464)</td>
<td>(205,215)</td>
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<td>SIR Hedged Equity Fund, Ltd. – hedge funds</td>
<td>2,991,158</td>
<td>51,354</td>
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<td>Siris Partners II &amp; III, LP – private equity</td>
<td>523,608</td>
<td>8,990</td>
<td>532,598</td>
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<td>State Street Global Advisors – emerging markets</td>
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<td>157,670</td>
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<td>StepStone Capital Buyout Fund I &amp; II, LP – private equity</td>
<td>267,412</td>
<td>4,591</td>
<td>272,003</td>
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<tr>
<td>StepStone Opportunities Fund II, LP – private equity</td>
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<td>582</td>
<td>34,484</td>
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<tr>
<td>Stone Harbor Investment Partners, LP – emerging markets</td>
<td>182,190</td>
<td>3,128</td>
<td>185,318</td>
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<tr>
<td>Veritas Capital Fund III &amp; IV, LP – private equity</td>
<td>2,862,296</td>
<td>49,142</td>
<td>2,911,438</td>
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<tr>
<td>Viking GlobalEquities III, Ltd. – hedge funds</td>
<td>4,444,292</td>
<td>76,303</td>
<td>4,520,595</td>
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<td><strong>Total investment management fees</strong></td>
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<td>2,276,419</td>
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<table>
<thead>
<tr>
<th>Other investment fees</th>
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<tbody>
<tr>
<td>Investment consultant fees</td>
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<tr>
<td>Albert A. Slawsky</td>
</tr>
<tr>
<td>Summit Strategies, Inc.</td>
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<tr>
<td>TimberLink Consulting</td>
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<table>
<thead>
<tr>
<th>Investment custodial fees</th>
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<tbody>
<tr>
<td>BNY Mellon</td>
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</table>

<table>
<thead>
<tr>
<th>Performance and risk measurement fees</th>
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<tr>
<td>BNY Mellon</td>
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<tr>
<td>MSCI, Inc.</td>
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<table>
<thead>
<tr>
<th>Internal investment activity expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,803,355</td>
</tr>
</tbody>
</table>

| **Total investing activity expenses** | 137,901,518 | 2,367,600 | 140,269,118 |

<table>
<thead>
<tr>
<th>Securities lending activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Securities lending borrower rebates</td>
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</table>

<table>
<thead>
<tr>
<th>Securities lending management fees</th>
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</thead>
<tbody>
<tr>
<td>BNY Mellon</td>
</tr>
<tr>
<td>Deutsche Bank</td>
</tr>
</tbody>
</table>

| **Total securities lending activity expenses** | 33,455 | 574 | 34,029 |

| **Total investment expenses** | $137,934,973 | $2,368,174 | $140,303,147 |
### ADDITIONAL FINANCIAL INFORMATION

#### Pension Trust Funds

**Schedules of Internal Investment Activity Expenses | Year Ended June 30, 2017**

<table>
<thead>
<tr>
<th></th>
<th>MSEP</th>
<th>Judicial Plan</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personnel services</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salaries</td>
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<td>822,868</td>
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<tr>
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<td>54,211</td>
<td>3,211,764</td>
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<td><strong>Professional services</strong></td>
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<td></td>
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<tr>
<td>Attorney services</td>
<td>148,466</td>
<td>2,549</td>
<td>151,015</td>
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<tr>
<td><strong>Total professional services</strong></td>
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<td>2,549</td>
<td>151,015</td>
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<td><strong>Communications</strong></td>
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<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>15,807</td>
<td>271</td>
<td>16,078</td>
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<tr>
<td><strong>Total communications</strong></td>
<td>15,807</td>
<td>271</td>
<td>16,078</td>
</tr>
<tr>
<td><strong>Facilities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utilities</td>
<td>2,997</td>
<td>51</td>
<td>3,048</td>
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<td>51,187</td>
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<td>35,494</td>
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<td><strong>Total facilities</strong></td>
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<td>1,654</td>
<td>98,005</td>
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<td><strong>Software and equipment</strong></td>
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<tr>
<td>Computer supplies and software</td>
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<td>7,884</td>
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<td>Depreciation</td>
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<td>2,661</td>
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<td>Loss on sale of equipment</td>
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<td>3,292</td>
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<td><strong>Total software and equipment</strong></td>
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<td>234</td>
<td>13,837</td>
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<tr>
<td><strong>Education, meetings and travel</strong></td>
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<td></td>
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<td>Tuition reimbursement</td>
<td>8,274</td>
<td>142</td>
<td>8,416</td>
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<td>Professional development including travel</td>
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<td>27,185</td>
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<tr>
<td>Due diligence travel</td>
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<td>293</td>
<td>17,384</td>
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<td><strong>Total travel and meetings</strong></td>
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<td>894</td>
<td>52,985</td>
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<tr>
<td><strong>General</strong></td>
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<td></td>
</tr>
<tr>
<td>Research and information services</td>
<td>292,039</td>
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<td>297,053</td>
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<td>13,745</td>
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<td>1,195</td>
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<td>Periodicals and publications</td>
<td>9,444</td>
<td>162</td>
<td>9,606</td>
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<tr>
<td>Miscellaneous expense</td>
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<td>58</td>
<td>3,371</td>
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<td><strong>Total general</strong></td>
<td>319,484</td>
<td>5,486</td>
<td>324,970</td>
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<td><strong>Total internal investment activity expenses</strong></td>
<td>$3,803,355</td>
<td>$65,299</td>
<td>$3,868,654</td>
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</table>
## Missouri State Employees’ Retirement System / Fiscal Year 2017

### Financial Section

**ADDITIONAL FINANCIAL INFORMATION**

### Pension Trust Funds

**Schedules of Administrative Expenses** | Year Ended June 30, 2017

<table>
<thead>
<tr>
<th>Personnel services</th>
<th>MSEP</th>
<th>Judicial Plan</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salaries</td>
<td>$4,339,071</td>
<td>$ 74,496</td>
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<td>1,818,687</td>
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<th>Professional services</th>
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<tr>
<td>Actuarial services</td>
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<td>6,137</td>
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<tr>
<td>Attorney services</td>
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<td>185,293</td>
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<td>80,545</td>
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<td>81,928</td>
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<td>36,415</td>
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<td>37,040</td>
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<td>Consulting services</td>
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<td>Total professional services</td>
<td>902,604</td>
<td>15,497</td>
<td>918,101</td>
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<table>
<thead>
<tr>
<th>Communications</th>
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<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Video production</td>
<td>2,007</td>
<td>34</td>
<td>2,041</td>
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<td>Telephone</td>
<td>64,450</td>
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<td>65,557</td>
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<td>Printing</td>
<td>32,134</td>
<td>552</td>
<td>32,686</td>
</tr>
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<td>Postage and mailing</td>
<td>109,159</td>
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<td>111,033</td>
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<td>207,750</td>
<td>3,567</td>
<td>211,317</td>
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<table>
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<tr>
<th>Facilities</th>
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<th></th>
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</thead>
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<tr>
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<td>1,906</td>
<td>112,944</td>
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<td>836</td>
<td>49,555</td>
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<td>1,444</td>
<td>85,577</td>
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<tr>
<td>Vehicle maintenance and operation</td>
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<td>4,985</td>
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<table>
<thead>
<tr>
<th>Software and equipment</th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer supplies and software</td>
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<td>1,684</td>
<td>99,757</td>
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<td>Equipment rental</td>
<td>151,475</td>
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<td>154,076</td>
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<td>Loss on sale of equipment</td>
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<td>19,027</td>
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<td>Total software and equipment</td>
<td>612,854</td>
<td>10,522</td>
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</table>

<table>
<thead>
<tr>
<th>Education, meetings and travel</th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Board travel and meetings</td>
<td>22,235</td>
<td>382</td>
<td>22,617</td>
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<td>Professional development including travel</td>
<td>88,745</td>
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<td>MOSERS sponsored seminars</td>
<td>90,117</td>
<td>1,547</td>
<td>91,664</td>
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<td>7,259</td>
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<td>860</td>
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<td>875</td>
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<td>Total education, meetings and travel</td>
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<td>3,591</td>
<td>212,684</td>
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</table>

<table>
<thead>
<tr>
<th>General</th>
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<th></th>
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<tr>
<td>Advertising</td>
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<td>Research and information services</td>
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<td>Insurance</td>
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<td>177,225</td>
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<td>Membership dues</td>
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<td>25,869</td>
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<td>61,378</td>
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<td>7,578</td>
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<td>7,708</td>
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<td>Periodicals and publications</td>
<td>81,765</td>
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<td>83,169</td>
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<tr>
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<td>(1)</td>
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</tr>
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</table>

62 Missouri State Employees’ Retirement System / Fiscal Year 2017
## Internal Service Funds

### Schedules of Administrative Expenses | Year Ended June 30, 2017

<table>
<thead>
<tr>
<th></th>
<th>Life and LTD</th>
<th>Deferred Compensation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personnel services</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salaries</td>
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<td>$228,614</td>
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</tr>
<tr>
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<td>404,926</td>
<td>321,071</td>
<td>725,997</td>
</tr>
<tr>
<td><strong>Professional services</strong></td>
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<tr>
<td>Attorney services</td>
<td>560</td>
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<tr>
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<td>498</td>
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<td><strong>Total professional services</strong></td>
<td>6,703</td>
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<td></td>
<td></td>
</tr>
<tr>
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<td>5,602</td>
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<tr>
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<td>4,517</td>
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<td>6,937</td>
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<tr>
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<td><strong>Software and equipment</strong></td>
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<td></td>
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<tr>
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<tr>
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<td>19,412</td>
</tr>
<tr>
<td>Equipment rental</td>
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<td>10,616</td>
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<tr>
<td><strong>Total software and equipment</strong></td>
<td>34,575</td>
<td>8,714</td>
<td>43,289</td>
</tr>
<tr>
<td><strong>Education, meetings and travel</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Board travel and meetings</td>
<td>1,558</td>
<td>0</td>
<td>1,558</td>
</tr>
<tr>
<td>Professional development including travel</td>
<td>6,100</td>
<td>11,792</td>
<td>17,892</td>
</tr>
<tr>
<td>MOSERS sponsored seminars</td>
<td>6,316</td>
<td>442</td>
<td>6,758</td>
</tr>
<tr>
<td>Due diligence travel</td>
<td>500</td>
<td>2,412</td>
<td>2,912</td>
</tr>
<tr>
<td><strong>Total education, meetings and travel</strong></td>
<td>14,474</td>
<td>14,646</td>
<td>29,120</td>
</tr>
<tr>
<td><strong>General</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advertising</td>
<td>1,707</td>
<td>8,604</td>
<td>10,311</td>
</tr>
<tr>
<td>Research and information services</td>
<td>5,358</td>
<td>14,780</td>
<td>20,138</td>
</tr>
<tr>
<td>Insurance</td>
<td>12,311</td>
<td>0</td>
<td>12,311</td>
</tr>
<tr>
<td>Membership dues</td>
<td>1,782</td>
<td>1,425</td>
<td>3,207</td>
</tr>
<tr>
<td>Business continuity</td>
<td>5,730</td>
<td>0</td>
<td>5,730</td>
</tr>
<tr>
<td>Office supplies</td>
<td>4,160</td>
<td>483</td>
<td>4,63</td>
</tr>
<tr>
<td>Periodicals and publications</td>
<td>531</td>
<td>0</td>
<td>531</td>
</tr>
<tr>
<td><strong>Total general</strong></td>
<td>31,579</td>
<td>25,292</td>
<td>56,871</td>
</tr>
<tr>
<td><strong>Total administrative expenses</strong></td>
<td>$532,169</td>
<td>$417,952</td>
<td>$950,121</td>
</tr>
</tbody>
</table>
### Schedules of Professional Service Fees | Year Ended June 30, 2017

<table>
<thead>
<tr>
<th>Professional Services</th>
<th>Nature of Service</th>
<th>Pension Trust Funds</th>
<th>Internal Service Funds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>MSEP</td>
<td>Judicial Plan</td>
</tr>
<tr>
<td>Operation administrative expenses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Albert A. Slawsky</td>
<td>Asset consulting</td>
<td>$8,667</td>
<td>$149</td>
</tr>
<tr>
<td>Avtex Solutions, Inc.</td>
<td>Information technology consulting</td>
<td>3,356</td>
<td>58</td>
</tr>
<tr>
<td>Cavanaugh Macdonald</td>
<td>Actuarial</td>
<td>116,518</td>
<td>2,001</td>
</tr>
<tr>
<td>Central Bank</td>
<td>Banking</td>
<td>36,415</td>
<td>625</td>
</tr>
<tr>
<td>Charlesworth &amp; Associates</td>
<td>Risk management consulting</td>
<td>8,980</td>
<td>154</td>
</tr>
<tr>
<td>Collector Solutions, Inc.</td>
<td>Banking</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Corporate Renaissance Group</td>
<td>Information technology consulting</td>
<td>82</td>
<td>1</td>
</tr>
<tr>
<td>DeKalb County Probate Court</td>
<td>Legal counsel</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Dell</td>
<td>Information technology consulting</td>
<td>9,961</td>
<td>171</td>
</tr>
<tr>
<td>Gabriel, Roeder, Smith &amp; Co.</td>
<td>Actuarial</td>
<td>240,935</td>
<td>4,137</td>
</tr>
<tr>
<td>Gamble &amp; Schlemeier, Ltd.</td>
<td>Governmental consulting</td>
<td>24,929</td>
<td>428</td>
</tr>
<tr>
<td>Huber &amp; Associates</td>
<td>Information technology consulting</td>
<td>8,371</td>
<td>144</td>
</tr>
<tr>
<td>ICON Integration and Design, Inc.</td>
<td>Pension administration</td>
<td>89,746</td>
<td>1,541</td>
</tr>
<tr>
<td>Linea Solutions</td>
<td>Legal counsel</td>
<td>91,933</td>
<td>1,578</td>
</tr>
<tr>
<td>Thompson Coburn, LLP</td>
<td>Legal counsel</td>
<td>182,156</td>
<td>3,127</td>
</tr>
<tr>
<td>Williams Keepers, LLC</td>
<td>Financial audit</td>
<td>80,545</td>
<td>1,383</td>
</tr>
<tr>
<td>Operations administrative expenses subtotal</td>
<td></td>
<td>902,604</td>
<td>15,497</td>
</tr>
<tr>
<td>Internal investment administrative expenses</td>
<td>Legal counsel</td>
<td>24,228</td>
<td>416</td>
</tr>
<tr>
<td>Thompson Coburn, LLP</td>
<td>Legal counsel</td>
<td>124,238</td>
<td>2,133</td>
</tr>
<tr>
<td>Internal investment administrative expenses subtotal</td>
<td></td>
<td>148,466</td>
<td>2,549</td>
</tr>
<tr>
<td>Total professional fees</td>
<td></td>
<td>$1,051,070</td>
<td>$18,046</td>
</tr>
</tbody>
</table>

Information on investment management and consulting fees can be found in the Schedule of Investment Expenses on pages 59-60.
MOSERS’ first investment transaction occurred in 1957 when a single outside advisor placed $100,000 in a 90-day U.S. Treasury Bill on behalf of plan participants. By 1987, MOSERS’ total investments exceeded $1 billion. This is a notable accomplishment as it took nearly 30 years to break this mark.
Investment Section

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Chief Investment Officer’s Report

October 16, 2017

Dear Members:

I start this letter by thanking the MOSERS Board of Trustees and executive director, John Watson, for allowing me the honor of leading the investment effort at MOSERS.

MOSERS’ fund returned 3.5% this fiscal year, which is 1.9% more than expected from passive investing. The extra return was made from decisions MOSERS’ investment staff implemented through the year. We achieved this excess return while also cutting about $7 million in management fees (about 12% savings). Finishing with higher-than-expected returns and reducing fees are the two things staff has the most control over and, by those measurements, this year was a success.

However, our absolute return is lower than what most other pension funds experienced. The reason for the performance difference is because we do not own what they own. By way of analogy, investment portfolios are like recipes. Think of the recipe for a chocolate chip cookie. Now, think of the recipe for a brownie. The two recipes contain many of the same ingredients, but the outcomes are distinct. In 2012, MOSERS chose a cookie recipe for portfolio returns, but all other pension funds chose a brownie recipe. Therefore, since the recipes are different, it follows that MOSERS’ outcomes will be different.

So far as I can tell, having foresight about which recipe will be most rewarded in any given year is impossible. This year stocks, the most common ingredient in the other pension recipes, were the highest returning asset. As a rule of thumb, other funds have 85% of their outcome linked to stocks. MOSERS has only 40% of our outcome linked to stocks. When stocks are up 18%, having 85% of your outcome linked to equities is a good thing. However, equities do not always provide these returns. In fact, sometimes they lose money. In losing environments the preference will be for fewer stocks.

Why is our recipe different? In 2012, when the recipe was changed, MOSERS had one of the highest return hurdles in the country. Speaking technically, our “real return assumption”—that is, what we assumed our return would be after adjusting for inflation—was tied for the highest in the U.S. at 5.5%. At that time, using a recipe similar to other public pension funds would not have achieved the high return. So, in order to clear the hurdle, the portfolio had to shift to something that was different. That’s why we chose a different recipe in 2012.

Now, let’s talk about where MOSERS is going. Over the last two years, the MOSERS Board of Trustees has lowered the real rate of return assumption. For fiscal year 2017, the board lowered the rate from 5.5% to 5.15% and for fiscal year 2018 the board adopted a rate of 5%. It is important for MOSERS’ return assumptions to be economically viable, because it will increase the likelihood of MOSERS achieving that return. There is currently a plan to continue reducing the return assumption in the future and this will increase the economic viability of MOSERS’ assumptions.

In addition, lowering the return assumption reduces the need for our portfolio to be different from the pension plan universe. Accordingly, we will begin discussions to consider a deliberate transition to a portfolio with a more comfortable risk profile.
However, as we move down this path, we have to be careful to make these moves in deliberate installments which can be tolerated by all MOSERS’ stakeholders. Our current situation accrued over a period of many years, so no single year will resolve the challenge. Ignoring this challenge is no longer acceptable, but we also have to acknowledge that all solutions require time. The great thing about defined benefit plans is this—we have some time. As the old saying goes: “Rome wasn’t built in a day.” Well, neither are solutions to pension plan funding. I am convinced that working together, MOSERS’ Board of Trustees and staff members will develop a plan that answers these challenges.

Sincerely,

Seth Kelly
Chief Investment Officer
Investment Policy Summary

Guiding Principles
Critical to the financial security of present and future benefit recipients is the effectiveness and efficiency of the system’s asset management program. The MOSERS Board of Trustees, charged with the responsibility for investing the assets of the system in a manner consistent with fiduciary standards set forth in the prudent person rule, has adopted the following fundamental principles to guide all investment-related decisions:

• Preserve the long-term corpus of the fund.
• Maximize total return within prudent risk parameters.
• Act in the exclusive interest of the system’s members.

The investment policy summary serves as a reference point for management of system assets and outlines MOSERS’ investment philosophy and practices. Investments within this report are presented on the basis of fair value using a variety of sources such as appraisals, valuations of underlying companies and assets for limited partnerships, and commingled funds, and through fair values obtained from the investment custodian.

Investment Objective
In keeping with the three guiding principles, the board has adopted the following broad investment objectives:

• Develop a real return objective (RRO) that will keep contribution rates reasonably level over long periods of time, absent changes in actuarial assumptions.
• Establish an asset allocation policy that is expected to meet the RRO over long periods of time, while minimizing the impact of the fund’s volatility on the contribution rate.
• Monitor costs associated with the efficient implementation of the asset allocation through the use of internal and external resources.

Investment Beliefs
MOSERS has arrived at investment beliefs, which are the foundation for implementation of the investment portfolio to achieve the institution’s objectives. These beliefs guide every decision made within MOSERS’ portfolio. They are the fundamental concepts underlying the MOSERS investment program. These beliefs are:

• Portfolio construction should focus first on risk; it is the allocation of risk that drives portfolio returns. While investment returns receive a lot of public attention, understanding risk across asset classes improves the consistency of returns for a given level of risk and thus provides more stability in the contribution rate for the employer. Returns are the end product, where risks are the ingredients.
• Diversification is critical because the future is unknown. Reliable diversification requires a fundamental understanding of the economic drivers of risk and return. MOSERS’ policy portfolio has been built upon the premise that very little is known about what the future holds.
• Every investment should be examined in the context of its potential return from beta (market return) and alpha (value added return); while separation is not always possible, every effort should be made to distinguish the two distinct return components. Beta is the return which is expected to be earned by investing passively within a specific asset class or compensated risk premium. Exposure to beta can be purchased cheaply, and over long periods of time, the beta return should be positive and coincide with the risk associated with a given asset class. In contrast, alpha is the return generated through a manager’s ability to select particular investments that perform better than the asset class as a whole. Alpha is a zero-sum game.
• Regardless of the source of the return, it is important to construct the portfolio based on a conscious decision to include a certain amount of beta exposure in the portfolio and a certain amount of alpha exposure. By consciously selecting this balance within the portfolio, staff is better able to manage the risks of the portfolio which increases the chance the RRO is achieved.
• Flexibility to opportunistically alter the portfolio when markets are driven to extremes as a result of short-term economic cycles is an important portfolio management tool. As a result of the cyclical nature of the economy, asset classes or investment strategies may be more or less attractive relative to others in given time frames, thus marginal flexibility in the allocation policy provides the system with the opportunity to capitalize on this within prudent risk constraints. Under circumstances where the valuations of a particular asset class are compelling, it may make sense to modify the portfolio’s allocation at the margins in order to capitalize on attractively valued opportunities without exposing the fund to additional risk.

Roles and Responsibilities

Board of Trustees
The board of trustees bears the ultimate fiduciary responsibility for the investment of system assets. Members of the board must adhere to state law and prudent standards of diligence with respect to their duties as investment fiduciaries. Accordingly, they are required to discharge their duties in the interest of plan participants. They must also “act with the same care, skill, prudence, and diligence under prevailing circumstances that a prudent person, acting in a similar capacity and familiar with those matters, would use in the conduct of a similar enterprise with similar aims.”¹ Specifically related to investments, the board, taking into consideration the recommendations of staff and the external asset consultants, is charged with the duties of establishing and maintaining broad policies and objectives for the investment program.

Executive Director
The executive director is appointed by and serves at the pleasure of the board. The board has given the executive director broad authority for planning, organizing, and administering the operations and investments of the system under broad policy guidance from the board. Specifically with regard to investments, the executive director is broadly responsible for the oversight of the investment program. The executive director must ensure that system assets are invested in accordance with the board’s policies and that internal controls are in place to safeguard system assets. The executive director must also certify that all manager hiring and termination decisions were made in accordance with the board’s governance policy. In addition, the executive director certifies strategic allocation decisions were made in accordance with the governance policy.

Chief Investment Officer (CIO) and Internal Staff
The CIO serves at the pleasure of the executive director, yet has a direct line of communication with the board on investment-related issues. The CIO has primary responsibility for the overall direction of the investment program. The CIO works with the external asset consultants and the executive director in advising the board on policies related to the investment program. The CIO has primary responsibility to make hiring and termination decisions related to money managers with the approval of the external general asset consultant. The CIO is also responsible for making strategic allocation decisions with the approval of the external general asset consultant. Other responsibilities of the CIO include monitoring the investment of system assets, overseeing external money managers and the internally managed portfolios, and keeping the board apprised of situations which merit their attention. The internal investment staff is accountable to the CIO.

External Asset Consultants
Summit Strategies Group of St. Louis, Missouri serves as the system’s external general asset consultant at the pleasure of the board. The primary duties of the external general asset consultant are to:

• Advise the board on policies related to the investment program.
• Provide a third-party perspective and level of oversight to the system’s investment program.

The external general asset consultant must approve all manager hiring and termination decisions and strategic allocation decisions made by the CIO. The external general asset consultant provides advice and input to the CIO and internal investment staff on investment-related issues and money manager searches.

Blackstone Alternative Asset Management serves as the system’s external hedge fund consultant at the pleasure of the board. The primary duties of the external hedge fund consultant are to:

• Advise the board on policies related to the hedge fund program.
• Provide a third-party perspective and level of oversight to the system’s hedge fund investment program.

¹ Section 105.688, RSMo - Investment Fiduciaries, Duties.
The external hedge fund consultant must approve all hedge fund manager hiring and termination decisions. The external hedge fund consultant provides advice and input to the CIO and internal investment staff on hedge fund program issues and manager searches.

Chief Auditor
The chief auditor reports directly to the executive director and if, in the opinion of the chief auditor circumstances warrant, may report directly to the board. The chief auditor is independent of the system’s investment operations and, among other duties, is responsible for providing objective audit and review services for the investment operations. It is the chief auditor’s objective to promote adequate and effective internal controls at a reasonable cost.

Master Custodian
Bank of New York Mellon serves as the master custodian of the system’s assets except in cases where investments are held in partnerships, commingled accounts, or unique asset classes where it is impossible for them to do so. The master custodian is responsible for maintaining the official book of record, providing performance reports, and serving as an additional layer of risk control in the safekeeping of system assets.

Asset Allocation
Determining the system’s asset allocation is regarded as one of the most important decisions in the investment management process. The board, with advice from staff and the external general asset consultant, has developed a risk-weighted policy allocation that is designed to achieve the long-term required return objectives of the system, given certain risk constraints. The current allocation reflects the need for a diversified portfolio, which will perform well in a variety of economic conditions and will help reduce the portfolio’s overall volatility. In determining the optimum mix of assets, the board considers five factors:

- The expected risk of each asset class.
- The expected rate of return for each asset class.
- The correlation between the rates of return of the asset classes.
- The investment objectives and risk constraints of the fund.
- The impact of the portfolio’s volatility on the contribution rate.

While the board maintains a set policy allocation mix, they have taken steps to provide flexibility by granting authority to the CIO, with the approval of the external general asset consultants and certification of the executive director, to make strategic allocation decisions to capitalize on attractively valued opportunities within prudent risk constraints. This flexibility has allowed the system to take advantage of changing market conditions. The table below illustrates the policy asset allocation and ranges formally adopted by the board in July 2016.

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Risk Allocation Policy</th>
<th>Risk Allocation Ranges</th>
<th>Benchmark Index (weight)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global opportunistic equity</td>
<td>36%</td>
<td>25% - 47%</td>
<td>MSCI ACWI + .75% - (38%)</td>
</tr>
<tr>
<td>Nominal bonds</td>
<td>24%</td>
<td>17% - 31%</td>
<td>Barclays Long Treasury</td>
</tr>
<tr>
<td>Inflation-linked bonds</td>
<td>8%</td>
<td>5% - 10%</td>
<td>Barclays 1-10 TIPS</td>
</tr>
<tr>
<td>Commodities</td>
<td>19%</td>
<td>13% - 25%</td>
<td>S&amp;P Goldman Sachs</td>
</tr>
<tr>
<td>Alternative beta</td>
<td>13%</td>
<td>9% - 17%</td>
<td>AQR DELTA</td>
</tr>
</tbody>
</table>

1 The board has granted the CIO the authority to alter the equal risk-weighted allocation policy. This authority exists within risk ranges as depicted in the table above. These risk ranges, like the policy allocation, are driven by the long-term volatility and correlation expectations for the five betas that make up the beta-balanced portfolio. The CIO will make these strategic allocation decisions away from the policy benchmark subject to consultation and agreement from the chief general asset consultant (CGAC).

2 Benchmarks are net of MOSERS’ actual leveraging costs on borrowed assets with the exception of the alternative beta benchmark which is net of management fees.

3 Morgan Stanley Capital International All Country World Index (net dividends). Legacy real estate and timber assets are benchmarked to the Dow Jones U.S. REIT Index and NCREIF Timber, respectively.

4 S&P Goldman Sachs Commodity Index/Bloomberg Commodity Index. The board approved a three-year transition from S&P GSCI to BCOM beginning August 1, 2016.

5 A diversified risk-balanced portfolio of liquid hedge fund risk premia managed by AQR Capital net of management fees.
Rebalancing
It is the responsibility of staff to ensure that the asset allocation adheres to the system’s rebalancing policy. MOSERS utilizes a combination of cash market and exchange traded futures transactions to maintain the total fund’s allocation at the broad policy level. Month-end reviews are conducted to bring the portfolio back within allowable ranges of the broad policy targets.

Risk Controls
MOSERS’ investment program faces numerous risks; however, the primary risk to MOSERS is that the assets will not support the liabilities over long periods of time. In order to control this risk and numerous other risks that face the system, the board has taken the following steps, on an ongoing basis, to help protect the system:

- Actuarial valuations are performed each year to ensure the system is on track to meet the funding objectives of the plan. In addition, every five years an external audit of the actuary is conducted to ensure that the assumptions being made and calculation methods being utilized are resulting in properly computed liabilities.
- Asset/liability studies are conducted at least once every five years. The purpose of these studies is to ensure that the current portfolio design is structured to meet the system's liabilities. During these studies, investment expectations are also reexamined in more detail.
- A governance policy, which incorporates investment limitations, is in place to ensure that board policies are clearly identified. Within these documents, desired outcomes are identified, responsibilities for individuals are identified in relation to particular areas of the portfolio’s management, and details are provided for measuring outcomes. Reporting requirements are clearly identified to ensure appropriate checks and balances are in place. In addition, annual performance audits are conducted to ensure the performance measurement tools and methodologies being utilized are proper.

Performance Objectives and Monitoring Process
Generating returns net of expenses equaling the RRO (5.15% in FY17) plus inflation remains the primary performance objective for the total fund.

The reason for the long-term focus on this objective is to preclude the temptation to overreact to events in the marketplace that have no relevance in the management of the relationship between the system's assets and liabilities. The resulting dilemma is the conflicting need to evaluate investment policy implementation decisions over shorter time frames while maintaining the longer-term focus necessary to manage and measure the fund’s performance relative to the RRO. To address this problem, the board evaluates performance relative to policy and strategy benchmarks. This helps to evaluate the board’s broad policy decisions and the staff and external consultant’s implementation decisions. Policy benchmarks measure broad investment opportunities of each sub-asset class in which MOSERS has chosen to invest. The strategy benchmarks represent decisions made by the CIO to strategically deviate from the policy asset allocation for each sub-asset class. The returns of the strategy benchmarks are determined based upon the actual weight of the asset class multiplied by the appropriate benchmark.

The policy and strategy benchmarks are used in the following manner to evaluate board and staff decisions:

- **Board Decisions:** The value added through board policy decisions is measured by the difference between the total fund policy benchmark return and the RRO. This difference captures the value added by the board through their policy asset allocation decisions relative to the return necessary to fund the system’s liabilities. A policy benchmark return greater than the RRO reflects value added through board decisions. A policy benchmark return less than the RRO reflects losses or shortfalls in performance in funding the liabilities. These policy decisions are measured over long periods of time.

- **CIO and External Consultants’ Decisions:** There are two components to decisions made by the CIO and external consultants, which are monitored by the board on an ongoing basis. They are: 1) strategic allocation decisions, and 2) implementation decisions.
Strategy decisions are made by the CIO, with the approval of the external general asset consultant and the review of the executive director, to deviate from the policy benchmark weight. The difference between the strategy benchmark return and the policy benchmark return captures the value added by the CIO through strategic decisions to overweight or underweight asset allocations relative to the board’s policy allocation decisions. A strategy benchmark return greater than the policy benchmark return reflects value added through the sub-asset class allocation decisions. A strategy benchmark return less than the policy benchmark return reflects losses to the fund’s performance based upon strategy decisions. Strategy decisions should be measured over all periods of time with majority weight placed on outcomes that have occurred over a market cycle.

Implementation decisions are money manager selection choices made by the CIO with the approval of the appropriate external consultant and the certification of the executive director that the decision was made in accordance with the board’s adopted governance policy. The value added through these decisions is measured by the difference between the actual portfolio return and the strategy benchmark return. This difference captures the value added through these external manager selection decisions. An actual portfolio return greater than the strategy benchmark return reflects value added through these external manager selection decisions. An actual portfolio return less than the strategy benchmark return reflects losses to the fund’s performance based upon implementation decisions. Implementation decisions should be measured over all periods of time with a majority weight placed on outcomes that have occurred over a market cycle.

The board reviews performance information on a quarterly basis to help ensure adequate monitoring of the fund’s overall performance objectives.
Total Fund Review

As of June 30, 2017, the MOSERS investment portfolio had a fair value of $8.1 billion. The graph to the right illustrates the growth of MOSERS’ portfolio since the system’s inception.

Investment Performance

MOSERS’ investments generated a time-weighted return of 3.5%, net of fees, for FY17. The total fund return exceeded the 1-year policy benchmark of 1.6%. This additional 1.9% investment return produced $152 million over what would have been earned if the fund had been invested passively in the policy benchmark.

Investment Performance vs. Required Rate of Return

The total fund investment return is compared to a required rate of return. The required rate of return is established by the board to determine how well the fund is performing over the long term in order to meet future plan obligations after accounting for inflation. The required rate of return for FY17 is equal to the RRO of 5.15% plus inflation. The best known measure of inflation is the Consumer Price Index (CPI).  

Given the randomness of the investment markets, the portfolio should not be expected to meet the required rate of return every year. A review of long periods of time is best to evaluate whether or not the total return has kept pace with the system’s funding objectives.

As indicated in the center bar chart, MOSERS’ investment returns trailed the required rate of return by 0.3% over the 20-year period ended June 30, 2017.

Investment Performance vs. Benchmark Comparisons

In addition to measuring performance relative to the required rate of return, the board also compares fund returns to the policy benchmark and the strategy benchmark. Returns for the total fund versus these benchmarks are displayed in the bar chart to the right.

The policy benchmark provides an indication of the returns that could have been achieved (excluding transaction costs) by a portfolio invested in the designated benchmarks for each asset class at the percentage weights allocated to each asset class in MOSERS’ policy asset allocation.

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2 Performance returns are calculated using a time-weighted rate of return on fair values.

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* As of June 30, 2017, the total fund policy benchmark was comprised of the following components: 38% MSCI ACWI Net +.75%, 44% Barclays Long Treasuries, 20% S&P GSCI/BCOM, 39% Barclays U.S. TIPS 1-10 YR, and 31% AQR Delta. All policy return components are adjusted for financing cost associated with the beta-balanced program. This program did not begin until September 2012.

** As of June 30, 2017, the strategy benchmark was comprised of the following components: 39.3% total opportunistic global equities strategy, 38.5% total nominal bonds strategy, 16.2% total commodities strategy, 37.6% total inflation-linked bonds strategy, and 29.2% total alternative beta strategy. All strategy return components are adjusted for financing cost associated with the beta-balanced program. This program did not begin until September 2012.
Comparison of the total return to the policy benchmark reflects the total value added or detracted by the CIO through strategic and manager implementation decisions. Value is added when the total fund return exceeds the policy benchmark return. The total fund 1-, 10-, 15-, and 20-year actual performance over performed its policy benchmark by 1.9%, 0.3%, 0.5% and 0.9% with the actual 3- and 5-year returns trailing the policy benchmarks by 2.0% and 0.5%, respectively.

The strategy benchmark is more narrowly defined and focuses on sub-asset class allocation decisions made by the CIO. Comparison of the strategy benchmark to the policy benchmark reflects the component of the value added or detracted which can be attributed to the strategic sub-class allocation decisions made by the CIO. Value is added when the strategy benchmark return exceeds the policy benchmark return. Comparison of the strategy benchmark to the total return reflects the component of the value added which can be attributed to the manager implementation (manager hiring and termination) decisions made by the CIO and approved by the external asset consultant. Value is added when the total fund return exceeds the strategy benchmark return.

**Total Fund Policy Allocation Overview**

As of June 30, 2017, the board’s broad policy allocation mix was 38% opportunistic global equities, 44% nominal bonds, 20% commodities, 39% inflation-linked bonds, and 31% alternative beta. The policy target, as of June 30, 2017, for each sub-asset class, along with the actual strategic allocation to each type of investment, is shown in the bar graph below.

The board has granted authority to the CIO to make strategic decisions. A strategic decision should be thought of as any decision that might cause MOSERS’ actual portfolio to differ from the policy asset allocation. This has allowed MOSERS to capitalize on investment opportunities at the margin by overweighting asset classes that are viewed as “cheap” relative to their historical norm and underweighting asset classes that are “expensive” relative to their historical norm.
The asset allocation is built upon the belief that diversification is critical. The tables below reflect the asset classes and their correlation to each other and the statistical performance data, net of fees, of the total fund, as of June 30, 2017.

**Total Fund - Correlation Table - 5 Years**

<table>
<thead>
<tr>
<th></th>
<th>Opportunistic Global Equities</th>
<th>Nominal Bonds</th>
<th>Commodities</th>
<th>Inflation-Linked Bonds</th>
<th>Alternative Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opportunistic global equities</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal bonds</td>
<td>(0.17)</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commodities</td>
<td>0.44</td>
<td>(0.34)</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inflation-linked bonds</td>
<td>0.25</td>
<td>0.64</td>
<td>0.14</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Alternative beta</td>
<td>0.39</td>
<td>0.15</td>
<td>(0.18)</td>
<td>0.21</td>
<td>1.00</td>
</tr>
</tbody>
</table>

**Total Fund - Statistical Performance**

<table>
<thead>
<tr>
<th>Portfolio Characteristics</th>
<th>1 Year</th>
<th>3 Year</th>
<th>5 Year</th>
<th>10 Year</th>
<th>15 Year</th>
<th>20 Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annualized return</td>
<td>3.5%</td>
<td>0.4%</td>
<td>5.9%</td>
<td>4.5%</td>
<td>7.3%</td>
<td>6.8%</td>
</tr>
<tr>
<td>Annualized standard deviation</td>
<td>4.4%</td>
<td>6.4%</td>
<td>6.3%</td>
<td>8.8%</td>
<td>8.4%</td>
<td>9.3%</td>
</tr>
<tr>
<td>Sharpe ratio</td>
<td>0.69</td>
<td>0.02</td>
<td>0.91</td>
<td>0.45</td>
<td>0.72</td>
<td>0.51</td>
</tr>
<tr>
<td>Excess return*</td>
<td>1.9%</td>
<td>(2.0)%</td>
<td>(0.6)%</td>
<td>0.2%</td>
<td>0.6%</td>
<td>0.9%</td>
</tr>
<tr>
<td>Beta*</td>
<td>0.76</td>
<td>0.87</td>
<td>0.91</td>
<td>0.74</td>
<td>0.79</td>
<td>0.83</td>
</tr>
<tr>
<td>Annualized alpha*</td>
<td>2.2%</td>
<td>(1.7)%</td>
<td>0.0%</td>
<td>1.2%</td>
<td>1.9%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Correlation*</td>
<td>0.98</td>
<td>0.93</td>
<td>0.94</td>
<td>0.95</td>
<td>0.95</td>
<td>0.96</td>
</tr>
<tr>
<td>Value added in dollars**</td>
<td>$152M</td>
<td>$(552)M</td>
<td>$(215)M</td>
<td>$352M</td>
<td>$975M</td>
<td>$1.7B</td>
</tr>
</tbody>
</table>

* As compared to the total fund policy benchmark.
** MOSERS’ earnings above what would have been earned if assets had been invested passively.
### Schedule of Investment Portfolios by Asset Class | As of June 30, 2017

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Fair Value</th>
<th>Percentage of Investments at Fair Value</th>
<th>Market Exposure</th>
<th>Percentage of Investments at Market Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Internal beta-balanced</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global opportunistic equities</td>
<td>$2,717,429,664</td>
<td>33.7%</td>
<td>$2,601,563,280</td>
<td>32.2%</td>
</tr>
<tr>
<td>Nominal bonds</td>
<td>747,798,836</td>
<td>9.3</td>
<td>2,840,437,911</td>
<td>35.2</td>
</tr>
<tr>
<td>Commodities</td>
<td>313,169,917</td>
<td>3.9</td>
<td>1,144,649,079</td>
<td>14.2</td>
</tr>
<tr>
<td>Inflation-linked bonds</td>
<td>912,475,569</td>
<td>11.3</td>
<td>2,673,386,121</td>
<td>33.1</td>
</tr>
<tr>
<td>Alternative beta</td>
<td>2,170,513,175</td>
<td>26.9</td>
<td>2,060,111,457</td>
<td>25.5</td>
</tr>
<tr>
<td><strong>Total internal beta-balanced</strong></td>
<td>6,861,387,161</td>
<td>85.1</td>
<td>11,320,147,848</td>
<td>140.2</td>
</tr>
<tr>
<td><strong>External beta-balanced</strong></td>
<td>943,582,998</td>
<td>11.7</td>
<td>943,582,998</td>
<td>11.7</td>
</tr>
<tr>
<td>Residual accounts from old portfolio</td>
<td>3,792,791</td>
<td>0.0</td>
<td>3,792,791</td>
<td>0.0</td>
</tr>
<tr>
<td>Cash reserve</td>
<td>261,705,569</td>
<td>3.2</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Grand total</strong></td>
<td>$8,070,468,519</td>
<td>100.0%</td>
<td>$12,267,523,637</td>
<td>151.9%</td>
</tr>
</tbody>
</table>

Reconciliation to **Statements of Fiduciary Net Position**

- Total portfolio value: $8,070,468,519
- Reverse repurchase agreements: 3,373,773,555
- Short-term investment fund (STIF): (2,418,765,451)
- Uninvested cash: 722,484
- Interest and dividends receivable: (5,469,068)
- Variation margin: (12,184,564)
- Investment sales: (10,435,252)
- Investment purchases payable: 10,165,707
- Fees payable: 10,314,862

Investments per **Statements of Fiduciary Net Position**: $9,018,590,792
### Schedule of Investment Advisors

<table>
<thead>
<tr>
<th>Investment Advisors Name</th>
<th>Style</th>
<th>Portfolio Fair Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actis Emerging Markets</td>
<td>Opportunistic global equities – emerging markets</td>
<td>$38,400,002</td>
</tr>
<tr>
<td>Alinda Capital Partners</td>
<td>Opportunistic global equities – infrastructure</td>
<td>21,005,641</td>
</tr>
<tr>
<td>AQR Capital Management</td>
<td>Alternative beta – multi-strategy</td>
<td>408,424,347</td>
</tr>
<tr>
<td>AQR Capital Management</td>
<td>External beta balanced – risk parity</td>
<td>405,634,864</td>
</tr>
<tr>
<td>Axiom Asia Private Capital Associates</td>
<td>Opportunistic global equities – emerging markets</td>
<td>85,825,308</td>
</tr>
<tr>
<td>Axxon Management</td>
<td>Opportunistic global equities – emerging markets</td>
<td>25,657,177</td>
</tr>
<tr>
<td>Bayview Asset Management</td>
<td>Opportunistic global equities – opportunistic mortgages</td>
<td>22,302,981</td>
</tr>
<tr>
<td>Blackstone Alternative Asset Management</td>
<td>Alternative beta – fund-of-funds</td>
<td>240,743,966</td>
</tr>
<tr>
<td>Blackstone Real Estate Partners</td>
<td>Opportunistic global equities – active real estate</td>
<td>117,182,318</td>
</tr>
<tr>
<td>Blakeney Management</td>
<td>Opportunistic global equities – emerging markets</td>
<td>51,978,370</td>
</tr>
<tr>
<td>Bridgewater Associates</td>
<td>Alternative beta – global macro</td>
<td>100,543,340</td>
</tr>
<tr>
<td>Bridgewater Associates</td>
<td>External beta balanced – risk parity</td>
<td>461,643,476</td>
</tr>
<tr>
<td>Campbell Group</td>
<td>Opportunistic global equities – timberland</td>
<td>1,005,329</td>
</tr>
<tr>
<td>CarVal Investors</td>
<td>Opportunistic global equities – distressed real estate debt</td>
<td>14,400,000</td>
</tr>
<tr>
<td>Catalyst Capital Group</td>
<td>Opportunistic global equities – Canadian distressed debt</td>
<td>99,323,485</td>
</tr>
<tr>
<td>Catterton Partners</td>
<td>Opportunistic global equities – corporate buyout</td>
<td>2,731,889</td>
</tr>
<tr>
<td>Cornwall Capital</td>
<td>Alternative beta – multi-strategy</td>
<td>62,747,524</td>
</tr>
<tr>
<td>Davidson Kempner Capital Management</td>
<td>Alternative beta – event driven</td>
<td>28,676,279</td>
</tr>
<tr>
<td>Development Partners International</td>
<td>Opportunistic global equities – emerging markets</td>
<td>43,070,044</td>
</tr>
<tr>
<td>DRI Capital</td>
<td>Opportunistic global equities – intellectual property</td>
<td>14,181,718</td>
</tr>
<tr>
<td>EIG Energy Partners</td>
<td>Opportunistic global equities – energy – diversified</td>
<td>15,758,412</td>
</tr>
<tr>
<td>EIG Energy Partners</td>
<td>Opportunistic global equities – energy – mezzanine</td>
<td>66,820,509</td>
</tr>
<tr>
<td>Elliott Management Corporation</td>
<td>Alternative beta – multi-strategy</td>
<td>190,191,000</td>
</tr>
<tr>
<td>Farallon Capital Partners</td>
<td>Alternative beta – multi-strategy</td>
<td>2,500,000</td>
</tr>
<tr>
<td>Gaoling Fund</td>
<td>Opportunistic global equities – long/short – equity</td>
<td>125,614,684</td>
</tr>
<tr>
<td>Glenview Capital Management</td>
<td>Opportunistic global equities – long/short – equity</td>
<td>39,781,005</td>
</tr>
<tr>
<td>Glenview Capital Management Sidecar</td>
<td>Opportunistic global equities – active equity</td>
<td>59,227,608</td>
</tr>
<tr>
<td>Global Forest Partners</td>
<td>Opportunistic global equities – timberland</td>
<td>141,717,994</td>
</tr>
<tr>
<td>Harvest Fund Advisors</td>
<td>Opportunistic global equities – active MLP</td>
<td>71,143,365</td>
</tr>
<tr>
<td>HBK Capital Management</td>
<td>Alternative beta – merger arbitrage</td>
<td>115,091,118</td>
</tr>
<tr>
<td>JLL Partners</td>
<td>Opportunistic global equities – corporate buyout</td>
<td>65,433,054</td>
</tr>
<tr>
<td>King Street Capital Management</td>
<td>Alternative beta – credit driven</td>
<td>4,299,013</td>
</tr>
<tr>
<td>Linden Capital Partners</td>
<td>Opportunistic global equities – corporate buyout</td>
<td>49,277,379</td>
</tr>
<tr>
<td>Mast Capital Management</td>
<td>Alternative beta – credit driven</td>
<td>21,196,607</td>
</tr>
<tr>
<td>Merit Energy Partners</td>
<td>Alternative beta – energy – oil &amp; gas</td>
<td>5,154,997</td>
</tr>
<tr>
<td>MHR Fund Management</td>
<td>Alternative beta – distressed debt</td>
<td>61,122,948</td>
</tr>
<tr>
<td>Millennium Technology Value Partners</td>
<td>Opportunistic global equities – direct secondaries</td>
<td>20,101,888</td>
</tr>
<tr>
<td>NISA Investment Advisors</td>
<td>Nominal bonds – passive long term U.S. treasuries</td>
<td>46,079,205</td>
</tr>
<tr>
<td>NISA Investment Advisors</td>
<td>Commodity – passive commodities</td>
<td>(6,642,698)</td>
</tr>
<tr>
<td>NISA Investment Advisors</td>
<td>Alternative beta – strategy</td>
<td>176,398,253</td>
</tr>
<tr>
<td>NISA Investment Advisors</td>
<td>Inflation-linked bonds – passive TIPS</td>
<td>268,528,249</td>
</tr>
<tr>
<td>Oaktree Capital Management</td>
<td>Opportunistic global equities – corporate buyout</td>
<td>13,357,793</td>
</tr>
<tr>
<td>Oaktree Capital Management</td>
<td>Opportunistic global equities – distressed debt</td>
<td>22,815,861</td>
</tr>
<tr>
<td>Pharo Management</td>
<td>Alternative beta – global macro</td>
<td>122,709,138</td>
</tr>
<tr>
<td>Investment Advisors Name</td>
<td>Style</td>
<td>Portfolio Fair Value</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>------------------------------------------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Silchester International Investors</td>
<td>Opportunistic global equities – active international equity</td>
<td>797,676,394</td>
</tr>
<tr>
<td>Silver Creek Capital Management</td>
<td>Opportunistic global equities – fund-of-funds (special situations)</td>
<td>22,245,213</td>
</tr>
<tr>
<td>Silver Lake Management Company</td>
<td>Opportunistic global equities – corporate buyout</td>
<td>4,348,208</td>
</tr>
<tr>
<td>SIR Capital Management</td>
<td>Alternative beta – equity market neutral</td>
<td>99,796,938</td>
</tr>
<tr>
<td>Siris Capital Group</td>
<td>Opportunistic global equities – corporate buyout</td>
<td>11,483,438</td>
</tr>
<tr>
<td>State Street Global Advisors</td>
<td>Opportunistic global equities – passive emerging markets</td>
<td>174,880,049</td>
</tr>
<tr>
<td>StepStone Group</td>
<td>Alternative beta – fund-of-funds corporate buyouts</td>
<td>24,976,953</td>
</tr>
<tr>
<td>Stone Harbor Investment Partners</td>
<td>Alternative beta – emerging market debt</td>
<td>53,072,830</td>
</tr>
<tr>
<td>Visium Asset Management</td>
<td>Alternative beta – long/short – equity</td>
<td>3,460,388</td>
</tr>
<tr>
<td>Miscellaneous (each less than $1M)</td>
<td></td>
<td>5,457,861</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>$5,383,517,364</strong></td>
</tr>
</tbody>
</table>
Total Fund - Top Ten Publicly Traded Separate Account Holdings

<table>
<thead>
<tr>
<th>Ten Largest Holdings as of June 30, 2017</th>
<th>Fair Value</th>
<th>Percent of the Total Fund</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Treasury Note – 1.750%, 2021</td>
<td>$246,365,200</td>
<td>3.05%</td>
</tr>
<tr>
<td>U.S. Treasury Note – 1.500%, 2026</td>
<td>168,233,468</td>
<td>2.08</td>
</tr>
<tr>
<td>U.S. Treasury Bond – 2.500%, 2045</td>
<td>138,181,676</td>
<td>1.71</td>
</tr>
<tr>
<td>U.S. Treasury CPI Inflation – 0.125%, 2022</td>
<td>131,588,543</td>
<td>1.63</td>
</tr>
<tr>
<td>U.S. Treasury CPI Inflation – 0.375%, 2023</td>
<td>131,164,678</td>
<td>1.62</td>
</tr>
<tr>
<td>U.S. Treasury CPI Inflation – 0.125%, 2023</td>
<td>130,161,409</td>
<td>1.61</td>
</tr>
<tr>
<td>U.S. Treasury CPI Inflation – 0.125%, 2024</td>
<td>129,778,974</td>
<td>1.61</td>
</tr>
<tr>
<td>U.S. Treasury CPI Inflation – 0.375%, 2025</td>
<td>128,492,657</td>
<td>1.59</td>
</tr>
<tr>
<td>U.S. Treasury Bond – 3.000%, 2045</td>
<td>124,535,140</td>
<td>1.54</td>
</tr>
<tr>
<td>U.S. Treasury CPI Inflation – 1.125%, 2021</td>
<td>122,940,399</td>
<td>1.52</td>
</tr>
</tbody>
</table>

* For a complete list of holdings, contact MOSERS.

Schedule of Investment Results* | 1-, 3-, 5-, 10-, 15- and 20-Year Periods

Total Fund – As of June 30, 2017, the total fund policy benchmark was comprised of the following components: 38% total opportunistic global equities policy, 44% total nominal bonds policy, 20% total commodities policy, 39% total inflation-linked bonds policy, and 31% total alternative beta policy. All policy return components are adjusted for financing cost associated with the beta-balanced program. This program did not begin until September 2012.

- **Opportunistic global equities** – As of June 30, 2017, the opportunistic global equities policy was MSCI ACWI Net +.75%. Legacy real estate and timber assets are benchmarked to the Dow Jones U.S. Select REIT Index and NCREIF Timber respectively.
- **Nominal bonds** – As of June 30, 2017, the total nominal bonds policy was Barclays Long Treasury.
- **Commodities** – As of June 30, 2017, the total commodities policy was 69.5% S&P GSCI and 30.5% BCOM.
- **Inflation-linked bonds** – As of June 30, 2017, the total inflation-linked bonds policy was Barclays US TIPS 1-10 YR.
- **Alternative beta** – As of June 30, 2017, the total alternative beta policy was AQR Delta.

<table>
<thead>
<tr>
<th></th>
<th>1 Year</th>
<th>3 Year</th>
<th>5 Year</th>
<th>10 Year</th>
<th>15 Year</th>
<th>20 Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total fund</strong></td>
<td>3.5%</td>
<td>0.4%</td>
<td>5.9%</td>
<td>4.5%</td>
<td>7.3%</td>
<td>6.8%</td>
</tr>
<tr>
<td><strong>Total fund policy benchmark</strong></td>
<td>1.6%</td>
<td>2.4%</td>
<td>6.4%</td>
<td>4.2%</td>
<td>6.8%</td>
<td>5.9%</td>
</tr>
<tr>
<td><strong>Opportunistic global equities</strong></td>
<td>15.3%</td>
<td>4.9%</td>
<td>11.4%</td>
<td>6.3%</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Opportunistic global equities benchmark</strong></td>
<td>16.0%</td>
<td>7.6%</td>
<td>12.4%</td>
<td>6.4%</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Nominal bonds</strong></td>
<td>(6.9)%</td>
<td>5.1%</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Nominal bonds policy benchmark</strong></td>
<td>(7.8)%</td>
<td>5.2%</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Commodities</strong></td>
<td>(11.0)%</td>
<td>(25.7)%</td>
<td>(14.6)%</td>
<td>(7.7)%</td>
<td>(1.0)%</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Commodities policy benchmark</strong></td>
<td>(8.8)%</td>
<td>(24.8)%</td>
<td>(13.7)%</td>
<td>(9.7)%</td>
<td>(2.6)%</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Inflation-linked bonds</strong></td>
<td>(1.1)%</td>
<td>(0.1)%</td>
<td>(0.1)%</td>
<td>4.1%</td>
<td>5.2%</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Inflation-linked bonds policy benchmark</strong></td>
<td>(0.9)%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>4.1%</td>
<td>5.2%</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Alternative beta</strong></td>
<td>6.7%</td>
<td>4.5%</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Alternative beta policy benchmark</strong></td>
<td>3.6%</td>
<td>6.2%</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>External risk parity</strong></td>
<td>6.7%</td>
<td>0.7%</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Total fund policy benchmark</strong></td>
<td>1.6%</td>
<td>2.4%</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

* Time weighted rates of return on fair values adjusted for cash flows.
### Schedule of Investment Manager Fees | For the Year Ended June 30, 2017

<table>
<thead>
<tr>
<th>Fund Company</th>
<th>Total Fees</th>
<th>Manager Fees</th>
<th>Incentive Fees Earned in FY17</th>
<th>Portfolio Company Charges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actis Emerging Markets III</td>
<td>$570,000</td>
<td>$514,000</td>
<td>$6,560</td>
<td>$0</td>
</tr>
<tr>
<td>Actis Emerging Markets IV</td>
<td>767,000</td>
<td>721,000</td>
<td>46,000</td>
<td>0</td>
</tr>
<tr>
<td>African Development Partners I, LLC</td>
<td>6,124,649</td>
<td>316,191</td>
<td>241,517</td>
<td>5,566,942</td>
</tr>
<tr>
<td>African Development Partners II, LLC</td>
<td>876,116</td>
<td>752,005</td>
<td>124,110</td>
<td>0</td>
</tr>
<tr>
<td>Alinda Infrastructure Fund I, LP</td>
<td>252,397</td>
<td>235,840</td>
<td>16,557</td>
<td>0</td>
</tr>
<tr>
<td>American Industrial Partners Capital Fund V, LP</td>
<td>560,543</td>
<td>345,000</td>
<td>30,773</td>
<td>193,770</td>
</tr>
<tr>
<td>American Industrial Partners Capital Fund VI, LP</td>
<td>547,566</td>
<td>500,000</td>
<td>47,566</td>
<td>0</td>
</tr>
<tr>
<td>AQR DELTA Sapphire Fund, LP</td>
<td>3,853,999</td>
<td>3,461,801</td>
<td>392,198</td>
<td>0</td>
</tr>
<tr>
<td>AQR Global Risk Premium Fund IV, LP</td>
<td>2,534,728</td>
<td>2,117,324</td>
<td>417,404</td>
<td>0</td>
</tr>
<tr>
<td>AQR Style Premia Fund, LP (260,960)</td>
<td>0</td>
<td>56,153</td>
<td>(317,113)</td>
<td>0</td>
</tr>
<tr>
<td>Astenbeck Capital Management</td>
<td>14,687,942</td>
<td>1,922,069</td>
<td>7,650</td>
<td>(317,113)</td>
</tr>
<tr>
<td>Axiom Asia Private Capital Fund II, LP</td>
<td>527,886</td>
<td>315,900</td>
<td>40,195</td>
<td>171,791</td>
</tr>
<tr>
<td>Axiom Asia Private Capital Fund III, LP</td>
<td>899,432</td>
<td>500,000</td>
<td>40,536</td>
<td>358,896</td>
</tr>
<tr>
<td>Axxon Brazil Private Equity Fund I B, LP</td>
<td>214,813</td>
<td>215,288</td>
<td>(475)</td>
<td>0</td>
</tr>
<tr>
<td>Bayview Opportunity Domestic III b, LP</td>
<td>2,012,366</td>
<td>1,818,244</td>
<td>382,550</td>
<td>811,573</td>
</tr>
<tr>
<td>Bayview Opportunity Domestic, LP</td>
<td>416,974</td>
<td>107,313</td>
<td>86,872</td>
<td>222,788</td>
</tr>
<tr>
<td>BlackRock Financial Management</td>
<td>851</td>
<td>851</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Blackstone Real Estate Partners IV</td>
<td>(264,839)</td>
<td>0</td>
<td>80,165</td>
<td>(345,004)</td>
</tr>
<tr>
<td>Blackstone Real Estate Partners V</td>
<td>1,637,500</td>
<td>82,871</td>
<td>36,033</td>
<td>1,539,492</td>
</tr>
<tr>
<td>Blackstone Real Estate Partners VI</td>
<td>1,861,237</td>
<td>723,857</td>
<td>42,261</td>
<td>1,249,887</td>
</tr>
<tr>
<td>Blackstone Real Estate Partners VII</td>
<td>2,016,005</td>
<td>392,198</td>
<td>47,566</td>
<td>1,539,492</td>
</tr>
<tr>
<td>Blackstone Topaz Fund, LP</td>
<td>3,076,671</td>
<td>2,366,927</td>
<td>323,611</td>
<td>386,133</td>
</tr>
<tr>
<td>Blakeney Onyx, LP</td>
<td>1,244,099</td>
<td>786,068</td>
<td>458,031</td>
<td>0</td>
</tr>
<tr>
<td>Bridgewater Associates - All Weather @ 12%, LLC</td>
<td>2,124,398</td>
<td>1,829,560</td>
<td>294,837</td>
<td>0</td>
</tr>
<tr>
<td>Bridgewater Associates - Diamond Ridge Fund, LLC</td>
<td>3,578,600</td>
<td>3,475,645</td>
<td>102,955</td>
<td>0</td>
</tr>
<tr>
<td>CarVal Investors CVI Global Value Fund A, LP - private debt</td>
<td>112,187</td>
<td>80,701</td>
<td>31,487</td>
<td>0</td>
</tr>
<tr>
<td>CarVal Investors CVI Global Value Fund A, LP - real estate</td>
<td>112,187</td>
<td>80,701</td>
<td>31,487</td>
<td>0</td>
</tr>
<tr>
<td>Castlake Aviation II, LP</td>
<td>399,034</td>
<td>238,965</td>
<td>76,498</td>
<td>83,571</td>
</tr>
<tr>
<td>Catalyst Fund III, LP</td>
<td>1,362,736</td>
<td>948,570</td>
<td>77,992</td>
<td>300,174</td>
</tr>
<tr>
<td>Catalyst Fund IV, LP</td>
<td>1,100,975</td>
<td>494,376</td>
<td>87,043</td>
<td>519,556</td>
</tr>
<tr>
<td>Catalyst Fund V, LP</td>
<td>4,038,430</td>
<td>1,977,504</td>
<td>348,351</td>
<td>1,712,575</td>
</tr>
<tr>
<td>Caterton Partners V, LP</td>
<td>132,623</td>
<td>113,555</td>
<td>7,731</td>
<td>11,337</td>
</tr>
<tr>
<td>Caterton Partners VI, LP</td>
<td>242,350</td>
<td>154,104</td>
<td>5,939</td>
<td>7,209</td>
</tr>
<tr>
<td>Caterton Partners VII, LP</td>
<td>580,308</td>
<td>322,687</td>
<td>16,068</td>
<td>226,968</td>
</tr>
<tr>
<td>Cornwall Domestic, LP</td>
<td>1,057,385</td>
<td>1,413,338</td>
<td>404,887</td>
<td>(760,840)</td>
</tr>
<tr>
<td>Davidson Kempner Institutional Partners, LP</td>
<td>685,496</td>
<td>274,609</td>
<td>90,143</td>
<td>320,744</td>
</tr>
<tr>
<td>DR1 Capital - LSRC</td>
<td>732,161</td>
<td>0</td>
<td>372,469</td>
<td>359,622</td>
</tr>
<tr>
<td>EIG Energy Fund XIV, LP</td>
<td>300,558</td>
<td>257,928</td>
<td>42,630</td>
<td>0</td>
</tr>
<tr>
<td>EIG Energy Fund XV, LP</td>
<td>578,248</td>
<td>479,837</td>
<td>98,411</td>
<td>0</td>
</tr>
<tr>
<td>EIG Energy Fund XVI, LP</td>
<td>1,471,813</td>
<td>500,000</td>
<td>53,268</td>
<td>918,545</td>
</tr>
<tr>
<td>Elliott International Ltd.</td>
<td>7,776,269</td>
<td>2,217,105</td>
<td>976,551</td>
<td>4,582,613</td>
</tr>
<tr>
<td>Farallon Capital Institutional Partners, LP</td>
<td>57,569</td>
<td>0</td>
<td>57,569</td>
<td>0</td>
</tr>
<tr>
<td>Gaoling Fund, LP</td>
<td>7,248,917</td>
<td>1,669,881</td>
<td>93,063</td>
<td>5,485,974</td>
</tr>
<tr>
<td>Garnet Sky Investors Company, Ltd.</td>
<td>2,622,791</td>
<td>641,276</td>
<td>113,438</td>
<td>1,868,077</td>
</tr>
<tr>
<td>Gateway Energy &amp; Resource Holdings, LLC</td>
<td>382,453</td>
<td>327,214</td>
<td>43,583</td>
<td>11,656</td>
</tr>
<tr>
<td>Glenview Capital Opportunity Fund, LP</td>
<td>387,820</td>
<td>241,151</td>
<td>146,669</td>
<td>0</td>
</tr>
<tr>
<td>Glenview Sidecar</td>
<td>166,220</td>
<td>0</td>
<td>166,220</td>
<td>0</td>
</tr>
<tr>
<td>Global Forest Partners GTI7 Institutional Investors Company, Ltd.</td>
<td>589,262</td>
<td>420,390</td>
<td>168,872</td>
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<tr>
<td>Harvest Fund Advisors, LLC</td>
<td>715,732</td>
<td>715,732</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>HBK Merger Strategies Offshore Fund, Ltd.</td>
<td>3,262,626</td>
<td>750,465</td>
<td>279,436</td>
<td>2,232,725</td>
</tr>
<tr>
<td>JLL Partners Fund V, LP</td>
<td>581,137</td>
<td>137,631</td>
<td>10,875</td>
<td>432,631</td>
</tr>
<tr>
<td>JLL Partners Fund VI, LP</td>
<td>3,260,820</td>
<td>459,672</td>
<td>33,268</td>
<td>2,767,880</td>
</tr>
<tr>
<td>King Street Capital, LP</td>
<td>76,127</td>
<td>53,142</td>
<td>0</td>
<td>22,985</td>
</tr>
<tr>
<td>King Street Capital, Ltd.</td>
<td>6,811</td>
<td>6,811</td>
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<td>0</td>
</tr>
<tr>
<td>Linden Capital Partners II, LP</td>
<td>3,717,135</td>
<td>1,868,416</td>
<td>16,570</td>
<td>3,514,427</td>
</tr>
<tr>
<td>Mast Credit Opportunities I, LP</td>
<td>830,960</td>
<td>634,252</td>
<td>196,708</td>
<td>0</td>
</tr>
<tr>
<td>Merit Energy Partners F-II, LP</td>
<td>186,334</td>
<td>114,824</td>
<td>71,510</td>
<td>0</td>
</tr>
</tbody>
</table>

Schedule of Investment Manager Fees continued on page 80
**Schedule of Investment Manager Fees continued from page 79**

<table>
<thead>
<tr>
<th>Investment Manager</th>
<th>Total Fees</th>
<th>Manager Fees</th>
<th>Fund Pass Through Expenses (1)</th>
<th>Incentive Fees Earned in FY17</th>
<th>Portfolio Company Charges (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MHR Institutional Partners II A, LP</td>
<td>428,039</td>
<td>0</td>
<td>38,274</td>
<td>389,765</td>
<td>0</td>
</tr>
<tr>
<td>MHR Institutional Partners III, LP</td>
<td>3,986,599</td>
<td>341,540</td>
<td>59,489</td>
<td>3,585,570</td>
<td>0</td>
</tr>
<tr>
<td>MHR Institutional Partners IV, LP</td>
<td>715,978</td>
<td>656,250</td>
<td>59,728</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Millennium Technology Value Partners II</td>
<td>737,808</td>
<td>484,664</td>
<td>21,912</td>
<td>231,232</td>
<td>0</td>
</tr>
<tr>
<td>New Mountain Partners III, LP</td>
<td>4,203,455</td>
<td>144,891</td>
<td>120,401</td>
<td>3,911,945</td>
<td>26,218</td>
</tr>
<tr>
<td>NISA Investment Advisors</td>
<td>4,767,533</td>
<td>4,767,533</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>OCM Opportunities Fund IV b, LP</td>
<td>2,142</td>
<td>0</td>
<td>6,614</td>
<td>(4,472)</td>
<td>0</td>
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<tr>
<td>OCM Opportunities Fund VII b, LP</td>
<td>630,482</td>
<td>186,987</td>
<td>305,945</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>OCM Opportunities Fund VIII b, LP</td>
<td>273,794</td>
<td>294,973</td>
<td>92,550</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>OCM Power Opportunities III, LP</td>
<td>511,341</td>
<td>167,754</td>
<td>326,133</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>OCM Real Estate Opportunities Fund III, LP</td>
<td>(77,006)</td>
<td>0</td>
<td>(94,298)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>OCM/GFI Power Opportunities Fund II, LP</td>
<td>123,574</td>
<td>0</td>
<td>103,456</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Perry Partners, LP</td>
<td>514</td>
<td>514</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pharo Macro Fund, Ltd.</td>
<td>6,806,474</td>
<td>2,254,041</td>
<td>4,473,989</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Resource Management Service – Wildwood Timberlands, LLC</td>
<td>974,988</td>
<td>368,506</td>
<td>568,783</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Silchester International Investors</td>
<td>4,620,851</td>
<td>4,620,851</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Silver Creek Special Opportunities Fund I, LP</td>
<td>26,602</td>
<td>0</td>
<td>26,602</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Silver Creek Special Opportunities Fund II, LP</td>
<td>38,090</td>
<td>0</td>
<td>38,090</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Silver Lake Partners II, LP</td>
<td>(205,215)</td>
<td>12,426</td>
<td>(218,636)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Siris Partners II, LP</td>
<td>218,317</td>
<td>133,078</td>
<td>81,339</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Siris Partners III, LP</td>
<td>314,281</td>
<td>262,500</td>
<td>51,781</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>State Street Global Advisors</td>
<td>157,670</td>
<td>157,670</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>SIR Hedged Equity Fund</td>
<td>3,042,511</td>
<td>1,924,917</td>
<td>935,183</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>StepStone Capital Buyout Fund I, LP</td>
<td>175,839</td>
<td>28,314</td>
<td>84,852</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>StepStone Capital Buyout Fund II, LP</td>
<td>96,164</td>
<td>66,253</td>
<td>29,911</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>StepStone Opportunities Fund II, LP</td>
<td>34,484</td>
<td>5,643</td>
<td>(52,311)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Stone Harbor Investment Partners</td>
<td>185,318</td>
<td>185,318</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>The Veritas Capital Fund III, LP</td>
<td>1,314,698</td>
<td>43,218</td>
<td>1,265,855</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>The Veritas Capital Fund IV, LP</td>
<td>1,596,740</td>
<td>158,663</td>
<td>1,433,329</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Viking Global Equities III, Ltd.</td>
<td>4,520,596</td>
<td>2,441,535</td>
<td>1,986,533</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Grand totals</strong></td>
<td><strong>$134,867,133</strong></td>
<td><strong>$58,327,216</strong></td>
<td><strong>$8,734,299</strong></td>
<td><strong>$67,746,268</strong></td>
<td><strong>$59,350</strong></td>
</tr>
</tbody>
</table>

(1) Fund Pass Through Expenses are administrative expenses charged to the fund and paid by the limited partners (including MOSERS), in addition to the management fee. These expenses may include, but are not limited to, accounting, audit, legal, and custody expenses directly related to the administration of the underlying fund investments.

(2) Portfolio Company Charges are fees/costs paid to the general partners of private equity funds which are not applied as offsets to gross management fees. These charges are paid by the underlying portfolio companies of the funds, and therefore, are indirectly paid by MOSERS.
Asset Class Summary

In general, an improved growth outlook and continued economic improvement led to improved returns for equity assets during the fiscal year. There was a large divergence in asset class performance during the fiscal year with three asset classes delivering a negative return and two delivering a positive return. Global equities were up 18.8% during the year after being down 3.1% during the past fiscal year. Long U.S. treasury bonds were down approximately 7.2% after being up 19.3% the prior fiscal year. Commodities were down 9.0% after being down 26.1% the prior fiscal year. Inflation-linked bonds were down 0.6% after being up 4.4% during the prior fiscal year. Alternative betas were up approximately 3.6% during the fiscal year after being up 6.6% the prior fiscal year. The external beta-balanced portfolio returned 6.7% during the past year after returning a (0.9%) the prior fiscal year.

Opportunistic Global Equities

It is expected that investments in this class will perform well during periods of rising economic growth and/or falling inflation. Investments in this asset class include U.S. and non-U.S. equity investments with varying characteristics related to market capitalization and investment style. Because of the non-U.S. nature of some of these investments, foreign currency exposure will be part of this portfolio.

Global equities were up 18.8% during the fiscal year with most of it occurring in the eight months of the year after the presidential election in the United States. In a reversal from last year, equity returns were stronger abroad than they were at home with U.S. equities up 17.3% for the fiscal year while developed international equities were up 20.3% and emerging markets were up 23.8%.

Within the U.S equity market, the financials and information technology performed best with returns of 35.3% and 33.9% during the fiscal year, respectively. The telecom and energy sectors were the worst performing sectors with returns of (11.7%) and (4.1%), respectively. Within developed equity markets (after adjusting for currency changes to the U.S. dollar), Austria and Spain posted the best returns during the fiscal year with a 61.6% and 41.5% return, respectively. Belgium and Denmark returned the least with (0.2%) and 5.3% returns, respectively.

The market exposure of the equity portfolio on June 30, 2017, was $2,601,563,280, representing 32.2% of total fund market exposure. The bar graph below (left) illustrates the actual exposure compared to policy. For the fiscal year, the equity allocation returned 15.3% versus 16.0% for the global equity policy benchmark. The underperformance was driven by the opportunistic equity portfolio lagging its benchmark by 1.9%. The bar graph below (right) illustrates actual performance as compared to the policy and strategy benchmarks.

* As of June 30, 2017, the opportunistic global equities policy was MSCI ACWI Net +.75%.

* As of June 30, 2017, the total opportunistic global equities strategy benchmark was comprised of the following components: 17.7% actual return of domestic equity exposure, 4.9% S&P MLP, 53.9% MSCI World ex. U.S. (Net), 15.2% MSCI Emerging Markets (Net) and 8.3% MSCI China. This asset class commenced September 2002.
The tables below show the commission brokerage activity and statistical performance that occurred within the global equity portfolio in FY17.

### Opportunistic Global Equities – Brokerage Activity

<table>
<thead>
<tr>
<th>Shares Traded</th>
<th>Volume of Trades</th>
<th>Commissions Paid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baird, Robert W &amp; Co., Inc.</td>
<td>4,647</td>
<td>$129,876</td>
</tr>
<tr>
<td>Banco Bilbao Vizcaya</td>
<td>350,000</td>
<td>111,103</td>
</tr>
<tr>
<td>Barclays Capital, Inc.</td>
<td>27,413</td>
<td>977,006</td>
</tr>
<tr>
<td>BMO Capital Markets Corp.</td>
<td>6,711</td>
<td>131,537</td>
</tr>
<tr>
<td>BTIG, LLC</td>
<td>9,313</td>
<td>193,061</td>
</tr>
<tr>
<td>Citigroup Global Markets, Inc.</td>
<td>77,185</td>
<td>3,025,880</td>
</tr>
<tr>
<td>Credit Suisse</td>
<td>8,217</td>
<td>17,164,439</td>
</tr>
<tr>
<td>FBR Capital Markets &amp; Co.</td>
<td>25,023</td>
<td>720,430</td>
</tr>
<tr>
<td>Goldman Sachs &amp; Co.</td>
<td>3,158</td>
<td>128,578</td>
</tr>
<tr>
<td>J.P. Morgan Clearing Corp.</td>
<td>2,845</td>
<td>48,160</td>
</tr>
<tr>
<td>Jefferies &amp; Co., Inc.</td>
<td>739,137</td>
<td>22,952,797</td>
</tr>
<tr>
<td>Merrill Lynch Pierce Fenner Smith, Inc.</td>
<td>318,411</td>
<td>10,598,430</td>
</tr>
<tr>
<td>Morgan Stanley &amp; Co., Inc.</td>
<td>101,703</td>
<td>384,049,823</td>
</tr>
<tr>
<td>National Financial Services Corp.</td>
<td>1,202</td>
<td>22,387</td>
</tr>
<tr>
<td>Pershing, LLC</td>
<td>4,677</td>
<td>124,564</td>
</tr>
<tr>
<td>Raymond James &amp; Associates, Inc.</td>
<td>6,620</td>
<td>88,794</td>
</tr>
<tr>
<td>RBC Capital Markets, LLC</td>
<td>151,718</td>
<td>4,055,919</td>
</tr>
<tr>
<td>UBS Securities, LLC</td>
<td>20,972</td>
<td>600,988</td>
</tr>
<tr>
<td>Weedon &amp; Co.</td>
<td>3,276</td>
<td>207,867</td>
</tr>
<tr>
<td>Wells Fargo Securities, LLC</td>
<td>1,753,796</td>
<td>53,422,567</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3,616,024</strong></td>
<td><strong>$498,754,206</strong></td>
</tr>
</tbody>
</table>

### Opportunistic Global Equities – Statistical Performance

<table>
<thead>
<tr>
<th>Portfolio Characteristics</th>
<th>1 Year</th>
<th>3 Year</th>
<th>5 Year</th>
<th>10 Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return</td>
<td>15.3%</td>
<td>4.9%</td>
<td>11.4%</td>
<td>6.3%</td>
</tr>
<tr>
<td>Annualized standard deviation</td>
<td>2.0%</td>
<td>5.5%</td>
<td>6.4%</td>
<td>10.6%</td>
</tr>
<tr>
<td>Sharpe ratio</td>
<td>7.57</td>
<td>0.86</td>
<td>1.78</td>
<td>0.55</td>
</tr>
<tr>
<td>Excess return*</td>
<td>(0.7)%</td>
<td>(2.7)%</td>
<td>(1.0)%</td>
<td>(0.1)%</td>
</tr>
<tr>
<td>Beta*</td>
<td>0.31</td>
<td>0.49</td>
<td>0.62</td>
<td>0.67</td>
</tr>
<tr>
<td>Annualized alpha*</td>
<td>9.8%</td>
<td>1.2%</td>
<td>3.5%</td>
<td>1.8%</td>
</tr>
<tr>
<td>Correlation*</td>
<td>0.78</td>
<td>0.85</td>
<td>0.86</td>
<td>0.94</td>
</tr>
</tbody>
</table>

*As compared to the total opportunistic global equities policy benchmark.*
Nominal Bonds
It is expected that investments in this asset class will perform well in periods of falling economic growth and falling inflation. Investments in this asset class include U.S. bonds that have been issued, collateralized or guaranteed by the U.S. Government, its agencies, or its instrumentalities. Because this asset class is invested in all U.S. bonds, there is currently not any foreign currency exposure as part of this portfolio.

Interest rates rose globally during the fiscal year leading to poor returns for nominal bonds. In the United States, the 10-year treasury rate increased approximately 0.8% as the Federal Reserve began tightening monetary policy by increasing short-term interest rates. Longer-term treasuries underperformed shorter-term treasuries during the fiscal year. For example, treasuries with a maturity of 20 years and longer returned (7.5%), while treasuries with a maturity in less than 10 years returned (1.3%). Among developed markets, Japan posted the worst 7- to 10-year maturity nominal bond performance with (10.9%), followed by Canada, (3.9%); U.S., (3.8%); Great Britain, (3.0%); and Germany, (0.8%).

As of June 30, 2017, the market exposure of the nominal bond portfolio was $2,840,437,911, representing 35.2% of total market exposure. The bar graph below (left) illustrates the actual exposure compared to policy. For the fiscal year, the nominal bond allocation returned (6.9%) versus (7.8%) for the nominal bond policy benchmark. A strategic decision preferring to own U.S. Treasury Inflation Protected Securities (TIPS) in lieu of nominal treasuries was the cause of the outperformance this year. The bar graph below (right) illustrates actual performance as compared to the policy and strategy benchmarks.

The table below shows the statistical performance that occurred within the nominal bond portfolio in FY17. There was no commission brokerage activity within the nominal bond portfolio in FY17.

Nominal Bonds – Statistical Performance

<table>
<thead>
<tr>
<th>Portfolio Characteristics</th>
<th>1 Year</th>
<th>3 Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return</td>
<td>(6.9)%</td>
<td>5.1%</td>
</tr>
<tr>
<td>Annualized standard deviation</td>
<td>9.0%</td>
<td>10.4%</td>
</tr>
<tr>
<td>Sharpe ratio</td>
<td>(0.81)</td>
<td>0.48</td>
</tr>
<tr>
<td>Excess return*</td>
<td>1.0%</td>
<td>(0.1)%</td>
</tr>
<tr>
<td>Beta*</td>
<td>0.93</td>
<td>0.95</td>
</tr>
<tr>
<td>Annualized alpha*</td>
<td>0.4%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Correlation*</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

* As compared to the total nominal bonds policy benchmark.

As of June 30, 2017, the total nominal bonds policy was Barclays Long Treasury. As of June 30, 2017, the total nominal bonds strategy benchmark was comprised of the following components: 95.0% total nominal bonds policy and 5.0 % Barclays U.S. Treasury Inflation Notes 10+ Year. This asset class commenced September 2012. Five-year data will be displayed when it becomes available.
Commodities

It is expected that investments in this asset class will perform well during periods of rising economic growth and rising inflation. Investments in the asset class may include investments in raw materials, materials required in the manufacturing of finished products, the owners of raw goods, and the producers of raw materials. Because this asset class is invested in all U.S. dollar commodities there is currently not any foreign currency exposure as part of this portfolio.

Commodities again had poor performance in the fiscal year as a result of three of the four commodity sectors producing negative returns. Energy produced the worst return for a second straight year with (14.8%) return, followed by agriculture with (13.1) and precious metals with (8.4%). The only positive return came from industrial metals with a 17.5% return. Within these sectors, zinc and copper performed best with 28.5% and 20.4% returns, respectively. The worse performing commodities during the fiscal year were sugar and soy meal with (35.0%) and (26.8%) returns, respectively.

As of June 30, 2017, the market exposure of the commodities portfolio was $1,144,649,079, representing 14.2% of the total market exposure. The bar graph below (left) illustrates the actual exposure compared to policy. For the fiscal year, the commodity allocation returned (11.0%) versus (8.8%) for the commodity policy benchmark. The primary driver of the underperformance was an overweight to energy via a strategic decision that was implemented with external active management. The bar graph below (right) illustrates actual performance as compared to the policy and strategy benchmarks.

The table below shows the statistical performance that occurred within the commodities portfolio in FY17. There was no commission brokerage activity within the commodities portfolio in FY17.

<table>
<thead>
<tr>
<th>Portfolio Characteristics</th>
<th>1 Year</th>
<th>3 Year</th>
<th>5 Year</th>
<th>10 Year</th>
<th>15 Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return</td>
<td>(11.0)%</td>
<td>(25.7)%</td>
<td>(14.6)%</td>
<td>(7.7)%</td>
<td>(1.0)%</td>
</tr>
<tr>
<td>Annualized standard deviation</td>
<td>13.1%</td>
<td>22.2%</td>
<td>18.9%</td>
<td>24.4%</td>
<td>23.7%</td>
</tr>
<tr>
<td>Sharpe ratio</td>
<td>(0.87)</td>
<td>(1.17)</td>
<td>(0.78)</td>
<td>(0.34)</td>
<td>(0.09)</td>
</tr>
<tr>
<td>Excess return*</td>
<td>(2.2)%</td>
<td>(0.9)%</td>
<td>(0.8)%</td>
<td>2.0%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Beta*</td>
<td>1.00</td>
<td>1.07</td>
<td>1.05</td>
<td>1.02</td>
<td>1.01</td>
</tr>
<tr>
<td>Annualized alpha*</td>
<td>(2.4)%</td>
<td>1.1%</td>
<td>(0.1)%</td>
<td>2.4%</td>
<td>1.9%</td>
</tr>
<tr>
<td>Correlation*</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
<td>0.98</td>
<td>0.99</td>
</tr>
</tbody>
</table>

*As compared to the total commodities policy benchmark.

As of June 30, 2017, the total commodities strategy benchmark was comprised of the following components: 14.7% total commodities policy, 31.0% Goldman Sachs Commodity Index, 39.0% Bloomberg Commodity Index, 7.1% Bloomberg Roll Select Commodity Index, 5.4% S&P GSCI Crude Oil Index and 2.9% S&P GSCI Brent Crude Index. This asset class commenced November 1998.
**Inflation-Linked Bonds**

It is expected that investments in this asset class will perform well during periods of falling economic growth and rising inflation. Investments in this asset class include U.S. bonds that have been issued, collateralized or guaranteed by the U.S. Government, its agencies, or its instrumentalities. All such securities must derive a significant portion of their value from changes in the respective issuer’s domestic inflation. Because this asset class is invested in all U.S. bonds, there is currently not any foreign currency exposure as part of this portfolio.

Inflation in the U.S. increased during the fiscal year to 1.6% year-over-year versus 1.0% as of June 30, 2016. Inflation continued to stay below the Federal Reserve’s target inflation rate of 2.0%. The 10-year real rate (the interest rate after subtracting the inflation rate) on TIPS increased by 0.5% during the fiscal year resulting in poor performance for inflation-linked bonds. U.S. TIPS returned (0.6%) as compared to Japan, (10.2%); Canada, (3.2%); Germany, 0.5%; and Great Britain, 3.7%.

As of June 30, 2017, the market exposure of the inflation-linked bond portfolio was $2,673,386,121, representing 33.1% of total notional exposure. The bar graph below (left) illustrates the actual exposure compared to policy. For the fiscal year, the inflation-linked bond allocation returned (1.1%) versus (0.9%) for the inflation-linked bond policy benchmark. There was no internal or external active management strategy during the year; thus providing a return that closely matched the benchmark. The bar graph below (right) illustrates actual performance as compared to the policy and strategy benchmarks.

The table below shows the statistical performance that occurred within the inflation-linked bond portfolio in FY17. There was no commission brokerage activity within the inflation-linked bond portfolio in FY17.

**Inflation-Linked Bonds – Statistical Performance**

<table>
<thead>
<tr>
<th>Portfolio Characteristics</th>
<th>1 Year</th>
<th>3 Year</th>
<th>5 Year</th>
<th>10 Year</th>
<th>15 Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return</td>
<td>(1.1)%</td>
<td>(0.1)%</td>
<td>(0.1)%</td>
<td>4.1%</td>
<td>5.2%</td>
</tr>
<tr>
<td>Annualized standard deviation</td>
<td>2.2%</td>
<td>3.0%</td>
<td>3.6%</td>
<td>6.0%</td>
<td>7.3%</td>
</tr>
<tr>
<td>Sharpe ratio</td>
<td>(0.76)</td>
<td>(0.13)</td>
<td>(0.08)</td>
<td>0.60</td>
<td>0.55</td>
</tr>
<tr>
<td>Excess return*</td>
<td>(0.3)%</td>
<td>(0.2)%</td>
<td>(0.2)%</td>
<td>0.0%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Beta*</td>
<td>0.99</td>
<td>1.00</td>
<td>0.99</td>
<td>1.00</td>
<td>1.01</td>
</tr>
<tr>
<td>Annualized alpha*</td>
<td>(0.4)%</td>
<td>(0.2)%</td>
<td>(0.2)%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Correlation*</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

*As compared to the total inflation-linked bonds policy benchmark.*
Alternative Beta

This asset class represents multiple hedge funds, and alternative betas. The hedge funds have been selected because they invest in difficult to obtain risk premiums or they are expected to produce alpha over an otherwise easy to obtain risk premium. Hedge fund betas are expected to produce positive risk premia and are obtained passively at fees lower than active management fees. As a result of the multitude of strategies being deployed, it is expected that this asset class will provide meaningful diversification to the portfolio. While the sensitivities to economics will be dependent on positioning at the time, it is expected that these betas will have their best returns in rising growth environments and their worst returns in falling growth environments. Because of the non-U.S. nature of some of these investments, foreign currency exposure will be part of this portfolio.

The alternative beta portfolio performed well during the fiscal year led by strong performance from event driven and equity market neutral which returned 11.8% and 11.3%, respectively. Managed futures and global macro were drags on performance as they returned (16.0%) and (6.5%), respectively, during the fiscal year.

As of June 30, 2017, the market exposure of the alternative beta portfolio was $2,060,111,457, representing 25.5% of total market exposure. The bar graph below (left) illustrates the actual exposure compared to policy. The alternative beta allocation returned 7.0% for the fiscal year versus 3.6% for alternative beta policy benchmark. The outperformance was attributable to active hedge fund managers who collectively represented approximately 69% of the allocation and returned 8.4% for the year. The bar graph below (right) illustrates actual performance as compared to the policy and strategy benchmarks.

The table below shows the statistical performance that occurred within the alternative betas portfolio in FY17. There was no commission brokerage activity within the alternative betas portfolio in FY17.

**Alternative Beta – Statistical Performance**

<table>
<thead>
<tr>
<th>Portfolio Characteristics</th>
<th>1 Year</th>
<th>3 Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return</td>
<td>7.0%</td>
<td>4.7%</td>
</tr>
<tr>
<td>Annualized standard deviation</td>
<td>1.3%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Sharpe ratio</td>
<td>4.88</td>
<td>1.84</td>
</tr>
<tr>
<td>Excess return*</td>
<td>3.4%</td>
<td>(1.4)%</td>
</tr>
<tr>
<td>Beta*</td>
<td>0.16</td>
<td>0.23</td>
</tr>
<tr>
<td>Annualized alpha*</td>
<td>6.2%</td>
<td>3.3%</td>
</tr>
<tr>
<td>Correlation*</td>
<td>0.47</td>
<td>0.54</td>
</tr>
</tbody>
</table>

*As compared to the total alternative betas policy benchmark.
**External Beta-Balanced**

Bridgewater All-Weather and AQR Global Risk Premium are utilized for the external portion of the risk balanced portfolio, while the internal portion is managed by staff utilizing NISA Investment Advisors to implement the trading and operational aspects of the program.

Bridgewater returned 6.2% for the fiscal year after returning 0.5% last fiscal year. AQR returned 7.1% for the fiscal year after returning (2.2%) last fiscal year. This fiscal year performance of both managers was above median compared with other risked balanced managers. These active managers invest in similar asset classes as the internal portfolio but hold them in different weights and implement different active portfolio management decisions.

As of June 30, 2017, the external beta-balanced portfolio returned 6.7% for the fiscal year and represented 11.7%, or $943,582,998 of market exposure. The bar graph below (left) illustrates the actual exposure of the allocation. There is no policy allocation to the external beta-balance. These managers hold similar asset classes but can have different weights to those asset classes as compared to their benchmark. As a portfolio, these two managers outperformed their benchmark for the year by 5.1%. The bar graph below (right) illustrates actual performance as compared to the policy and strategy benchmarks.

The table below shows the statistical performance that occurred within the external beta-balanced portfolio in FY17. There was no commission brokerage activity within the external beta-balanced portfolio in FY17.

### External Beta-Balanced – Statistical Performance

<table>
<thead>
<tr>
<th>Portfolio Characteristics</th>
<th>1 Year</th>
<th>3 Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return</td>
<td>6.7%</td>
<td>0.7%</td>
</tr>
<tr>
<td>Annualized standard deviation</td>
<td>6.7%</td>
<td>9.2%</td>
</tr>
<tr>
<td>Sharpe ratio</td>
<td>0.94</td>
<td>0.05</td>
</tr>
<tr>
<td>Excess return*</td>
<td>5.1%</td>
<td>(1.7)%</td>
</tr>
<tr>
<td>Beta*</td>
<td>1.09</td>
<td>1.25</td>
</tr>
<tr>
<td>Annualized alpha*</td>
<td>4.8%</td>
<td>(2.1)%</td>
</tr>
<tr>
<td>Correlation*</td>
<td>0.94</td>
<td>0.93</td>
</tr>
</tbody>
</table>

*As compared to the total policy benchmark.*

---

The Mosers' Strategy Benchmark* as of June 30, 2017, was equal to the MOSERS' total fund policy benchmark and the strategy benchmark was equal to the MOSERS' total fund strategy benchmark. This asset class commenced October 2012. Five-year data will be displayed when it becomes available.
## Securities Lending Program

During the fiscal year ended June 30, 2017, MOSERS’ net income through its securities lending program was $21,896. MOSERS lends its domestic equity, international equity and fixed income securities through Deutsche Bank which manages the program in an agent capacity. In an agent lending program, the agent lender is responsible for making the loans to various broker-dealers, investing the cash collateral associated with the loaned securities, marking the loans and collateral to market on a daily basis, and, in most cases, indemnifying the lender against the default of a broker-dealer to whom they have loaned securities on behalf of the beneficial owner.

In fiscal year 2017, income from domestic equity increased due to an increase in lending margin. During the fiscal year, all loans were repaid and there were no loans outstanding as of June 30, 2017. There was no income from international equity or fixed income as there were no securities to lend during the period. The tables as titled below show the last 10 years of activity for the securities lending program.

### Domestic Equity

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Average Lendable</th>
<th>Average on Loan</th>
<th>Average Utilization</th>
<th>Lending Margin (Basis Points)</th>
<th>Net Income (Loss)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>$440,025,347</td>
<td>$195,971,154</td>
<td>44.5%</td>
<td>36.6</td>
<td>$1,611,536</td>
</tr>
<tr>
<td>2009</td>
<td>307,082,718</td>
<td>114,261,769</td>
<td>37.2</td>
<td>52.0</td>
<td>1,596,245</td>
</tr>
<tr>
<td>2010</td>
<td>321,114,801</td>
<td>83,944,408</td>
<td>26.1</td>
<td>26.9</td>
<td>864,401</td>
</tr>
<tr>
<td>2011</td>
<td>376,047,357</td>
<td>111,263,248</td>
<td>29.6</td>
<td>16.5</td>
<td>619,648</td>
</tr>
<tr>
<td>2012</td>
<td>424,041,044</td>
<td>145,373,164</td>
<td>34.3</td>
<td>19.1</td>
<td>810,972</td>
</tr>
<tr>
<td>2013</td>
<td>238,024,131</td>
<td>69,543,634</td>
<td>29.2</td>
<td>25.1</td>
<td>596,941</td>
</tr>
<tr>
<td>2014</td>
<td>187,154,236</td>
<td>62,768,614</td>
<td>33.5</td>
<td>22.6</td>
<td>422,422</td>
</tr>
<tr>
<td>2015</td>
<td>168,456,525</td>
<td>53,517,452</td>
<td>31.8</td>
<td>6.9</td>
<td>116,204</td>
</tr>
<tr>
<td>2016</td>
<td>117,553,687</td>
<td>36,503,528</td>
<td>31.1</td>
<td>0</td>
<td>(49)</td>
</tr>
<tr>
<td>2017</td>
<td>36,343,073</td>
<td>4,063,557</td>
<td>11.2</td>
<td>6.0</td>
<td>21,896</td>
</tr>
</tbody>
</table>

### International Equity

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Average Lendable</th>
<th>Average on Loan</th>
<th>Average Utilization</th>
<th>Lending Margin (Basis Points)</th>
<th>Net Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>$467,893,205</td>
<td>$56,994,925</td>
<td>12.2%</td>
<td>15.5</td>
<td>$726,565</td>
</tr>
<tr>
<td>2010</td>
<td>277,251,343</td>
<td>19,736,528</td>
<td>7.1</td>
<td>4.0</td>
<td>109,946</td>
</tr>
<tr>
<td>2011</td>
<td>320,082,404</td>
<td>88,623,017</td>
<td>27.7</td>
<td>10.4</td>
<td>333,000</td>
</tr>
<tr>
<td>2012</td>
<td>309,052,299</td>
<td>47,666,253</td>
<td>15.4</td>
<td>7.5</td>
<td>230,655</td>
</tr>
<tr>
<td>2013</td>
<td>192,359,434</td>
<td>49,525,171</td>
<td>25.7</td>
<td>5.6</td>
<td>108,379</td>
</tr>
<tr>
<td>2014</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>2015</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>2016</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>2017</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>0</td>
</tr>
</tbody>
</table>

### Fixed Income

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Average Lendable</th>
<th>Average on Loan</th>
<th>Average Utilization</th>
<th>Lending Margin (Basis Points)</th>
<th>Net Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>$1,082,813,165</td>
<td>$894,372,380</td>
<td>82.6%</td>
<td>56.4</td>
<td>$6,104,526</td>
</tr>
<tr>
<td>2009</td>
<td>859,512,525</td>
<td>517,356,516</td>
<td>60.2</td>
<td>43.3</td>
<td>3,722,523</td>
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<td>505,690,676</td>
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<td>7.2</td>
<td>581,875</td>
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<td>516,553,974</td>
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</tr>
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<td>185,527,243</td>
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</table>
Construction of a new office building was initiated in 1997 during MOSERS’ 40th year of operation and was completed in February of 1998. Having grown from an initial staff of five employees in 1958 to a staff of nearly 60, the new facility was designed to welcome valued members, enhance communication and technology, and facilitate productivity including the maintenance of records for nearly 80,000 active, retired, and terminated-vested members.
Actuarial Section

89  Actuary's Certification Letter
91  Summary of Actuarial Assumptions
96  Employer Schedule of Funding Progress – Pension Trust Funds
97  Summary of Member Data Included in Valuations
98  Active Members by Attained Age and Years of Service
99  Schedules of Active Member Valuation Data – Last Ten Fiscal Years
100 Retirees and Beneficiaries Added and Removed – Last Ten Fiscal Years
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109 Analysis of Financial Experience

Summary of Plan Provisions
110 Comparison of Plans for General State Employees
112 Comparison of Plans for Legislators
114 Comparison of Plans for Statewide Elected Officials
116 Comparison of Plans for Judges
118 Comparison of Plans for Uniformed Members of the Water Patrol
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120 Long-Term Disability (LTD) Insurance Plans
121 Changes in Plan Provisions
122 Actuarial Present Values
October 16, 2017

The Board of Trustees
Missouri State Employees’ Retirement System
907 Wildwood Drive
Jefferson City, Missouri 65109

Dear Members of the Board:

At your request, we have performed an actuarial valuation of the Missouri State Employees’ Retirement System (MOSERS) as of June 30, 2017 for the purpose of determining contribution rates for fiscal year 2019. Actuarial valuations are prepared annually for the Missouri State Employees’ Plan (MSEP) and the Judicial Plan. The board of trustees is responsible for establishing and maintaining the funding policies for both plans. The major findings of the valuations are contained in this section, which reflects the plan provisions in place on June 30, 2017, as amended by legislation passed by the 2017 legislature.

In preparing our report, we relied, without audit, on information (some oral and some in writing) supplied by the system’s staff. This information includes, but is not limited to, statutory provisions, member data, and financial information. We found this information to be reasonably consistent and comparable with information used for other purposes. The valuation results depend on the integrity of this information. If any of this information is inaccurate or incomplete, our results may be different and our calculations may need to be revised.

We further certify that all costs, liabilities, and other factors for the plans have been determined on the basis of actuarial assumptions and methods which are individually reasonable (taking into account the experience of the plans and reasonable expectations); meet applicable Actuarial Standards of Practice (ASOPs); and which, in combination, offer our best estimate of anticipated experience affecting the plans. Nevertheless, the emerging costs of the plans will vary from those presented herein to the extent actual experience differs from that projected by the actuarial assumptions. The board of trustees has the final decision regarding the appropriateness of the assumptions and adopted them, as indicated in Appendix D of our MSEP Actuarial Valuation Report and Appendix C of our Judges Actuarial Valuation Report.

Future actuarial measurements may differ significantly from the current measurements presented in the June 30, 2017 valuation reports due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements; and changes in plan provisions or applicable law. Due to the limited scope of our assignment, we did not perform an analysis of the potential range of future measurements.
Actuarial computations presented in this section are for purposes of determining the recommended and statutory funding amounts for the plans. The calculations have been made on a basis consistent with our understanding of the plans' funding requirements and goals. Determinations for purposes other than meeting these requirements may be significantly different from the results shown in the June 30, 2017 valuation reports. Accordingly, additional determinations may be needed for other purposes.

We provided the information used in the supporting schedules in the Actuarial Section, and the Schedule of Employers' Net Pension Liability, Sensitivity of Net Pension Liability to Changes in the Discount Rate, Schedule of Changes in Employers' Net Pension Liability and the Schedule of Employer Contributions in the Financial Section.

Actuarial computations, based on the actuarial valuations performed as of June 30, 2017, were also prepared as of June 30, 2017 for purposes of fulfilling financial accounting requirements for the plans under Governmental Accounting Standard Number 67 (GASB 67). The assumptions used in the funding valuation were also used for GASB 67 reporting, including the use of a 7.50% discount rate for GASB 67 calculations (7.50% is the assumed rate of return used in the funding valuation). In addition, the entry age normal actuarial cost method, which is required to be used under GASB 67, is also used in the funding valuations. The actuarial assumptions and methods meet the parameters set by ASOPs, as issued by the Actuarial Standards Board, and generally accepted accounting principles (GAAP) applicable in the United States of America as promulgated by the Governmental Accounting Standards Board (GASB). Additional information related to GASB 67 can be found in the Financial Section of this report.

The consultants who worked on this assignment are pension actuaries. Cavanaugh Macdonald Consulting, LLC’s advice is not intended to be a substitute for qualified legal or accounting counsel.

We certify that, to the best of our knowledge and belief, the June 30, 2017 actuarial valuation reports are complete and accurate and have been prepared in accordance with generally recognized and accepted actuarial principles and practices. We are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein.

Sincerely,

Patrice A. Beckham, FSA, EA, FCA, MAAA
Principal and Consulting Actuary

Joseph A. Nichols, ASA, EA, MSPA, FCA, MAAA
Consulting Actuary
Summary of Actuarial Assumptions

Actuarial Methods
Calculation of normal cost and actuarial accrued liability
The funding method used to determine the normal cost and actuarial accrued liability was the entry age actuarial cost method described below.

• **Entry age actuarial cost method** – Under the entry age normal cost method, the actuarial present value of each member’s projected benefit is allocated on a level basis over the member’s compensation between the entry age of the member and their assumed exit age. The portion of the actuarial present value allocated to the valuation year is called the normal cost. The actuarial present value of benefits allocated to prior years of service is called the actuarial accrued liability. The unfunded actuarial accrued liability represents the difference between the actuarial accrued liability and the actuarial value of assets as of the valuation date. The unfunded actuarial accrued liability is calculated each year and reflects experience gains/losses.

Calculation of the actuarial value of assets (AVA)
The AVA is based on an open five-year smoothing method and is determined by spreading the difference between the actual investment income on market value and expected investment income on actuarial value. The difference is added to the net unrecognized gains or losses from previous years (difference between the beginning of year market value and beginning of year actuarial value) and then divided by 5 to create a phased-in amount. This phased-in amount is then added to the expected AVA at the valuation date (beginning of the AVA plus actual cash flow plus expected investment income). The AVA is limited by a corridor and must be no less than 80% of market value of assets and no greater than 125% of market value of assets.

Changes in methods and assumptions since the prior year
The assumed rate of investment return was decreased from 7.65% effective June 30, 2016 to 7.50% effective June 30, 2017.

Actuarial Assumptions
Economic Assumptions
• **Investment return** – 7.50%, compounded annually, net of investment expenses. (7.65% in June 30, 2016 valuation)
• **Inflation** – 2.50% per year
• **Payroll growth** – 3.00% per year
• **Cost-of-living adjustment (COLA)** – 4.00% on a compounded basis when a minimum COLA of 4.00% is in effect; 2.00% on a compounded basis when no minimum COLA is in effect.
• **Interest on member contributions** – 1.50% per year

Demographic Assumptions
• **Mortality** – The mortality assumption includes an appropriate level of conservatism that reflects expected future mortality improvement.

**MSEP/MSEP 2000/MSEP2011**
– **Post-retirement** – RP-2014 Healthy Annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 120%
– **Pre-retirement** – RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females
– **Long-term disability** – RP-2014 Disabled mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females

**Judicial Plan**
– **Post-retirement** – RP-2014 Healthy Annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 98%
– **Pre-retirement** – RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015
– **Long-term disability** – RP-2014 Disabled mortality table, projected from 2006 to 2026 with Scale MP-2015

The actuarial valuation computations were made by or under the supervision of a Member of the American Academy of Actuaries (MAAA). Assumptions were adopted based on the June 30, 2016 experience study.
## MSEP – Percent of Eligible Active Members Retiring Within the Next Year | June 30, 2017

<table>
<thead>
<tr>
<th>Retirement Age</th>
<th>1st Year</th>
<th>2nd Year</th>
<th>3rd Year</th>
<th>Percent Retiring</th>
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<tbody>
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<td>48</td>
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<td>78</td>
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<td>25%</td>
<td>23%</td>
<td>20%</td>
</tr>
</tbody>
</table>

## MSEP – Separations From Active Employment Before Service Retirement and Individual Pay Increase Assumptions | June 30, 2017

### Percent of Active Members Separating Within the Next Year

<table>
<thead>
<tr>
<th>Sample Ages</th>
<th>Years of Service</th>
<th>Termination*</th>
<th>Death**</th>
<th>Disability</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
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<td>24.0%</td>
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<td></td>
</tr>
<tr>
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<td>19.0%</td>
<td>21.5%</td>
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</tr>
<tr>
<td>2</td>
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<td>15.5%</td>
<td>16.3%</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>13.3%</td>
<td>13.5%</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>11.2%</td>
<td>11.3%</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>5</td>
<td>13.5%</td>
<td>14.0%</td>
<td>0.03%</td>
</tr>
<tr>
<td>30</td>
<td>6</td>
<td>10.6%</td>
<td>11.0%</td>
<td>0.03%</td>
</tr>
<tr>
<td>35</td>
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<td>8.2%</td>
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<td>40</td>
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<td>0.05%</td>
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<td>0.70%</td>
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<td>70</td>
<td>14</td>
<td>2.9%</td>
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</table>

### Pay Increase Assumptions for an Individual Employee***

<table>
<thead>
<tr>
<th>Years of Service</th>
<th>Merit and Seniority</th>
<th>Base (Economy)</th>
<th>Increase Next Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>2</td>
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<td>3.00%</td>
<td>4.50%</td>
</tr>
<tr>
<td>4</td>
<td>1.25%</td>
<td>3.00%</td>
<td>4.25%</td>
</tr>
<tr>
<td>5</td>
<td>1.00%</td>
<td>3.00%</td>
<td>4.00%</td>
</tr>
<tr>
<td>6</td>
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<td>4.00%</td>
</tr>
<tr>
<td>7</td>
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<td>1.00%</td>
<td>3.00%</td>
<td>4.00%</td>
</tr>
<tr>
<td>9</td>
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<td>3.00%</td>
<td>3.50%</td>
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<td>3.00%</td>
<td>3.50%</td>
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<td>3.50%</td>
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<td>3.00%</td>
<td>3.25%</td>
</tr>
<tr>
<td>30</td>
<td>0.25%</td>
<td>3.00%</td>
<td>3.25%</td>
</tr>
</tbody>
</table>

* Does not apply to elected officials and legislators.

** 2% of the deaths in active service are assumed to be duty-related.

*** Does not apply to members of the General Assembly.
### Elected Officials and Legislators – Percent of Active Members Retiring Within the Next Year | June 30, 2017

<table>
<thead>
<tr>
<th>Years of Service</th>
<th>Termination</th>
<th>Male/Female</th>
<th>Years of Service</th>
<th>Termination</th>
<th>Male/Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>8.0%</td>
<td>4-5</td>
<td>12.0%</td>
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<td></td>
</tr>
<tr>
<td>1-2</td>
<td>8.0</td>
<td>5-6</td>
<td>12.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-3</td>
<td>8.0</td>
<td>6-7</td>
<td>12.0</td>
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</tr>
<tr>
<td>3-4</td>
<td>8.0</td>
<td>7+</td>
<td>35.0</td>
<td></td>
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</tr>
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</table>

### Judicial Plan – Percent of Eligible Active Members Retiring Within the Next Year | June 30, 2017

<table>
<thead>
<tr>
<th>Age</th>
<th>Judicial Plan</th>
<th>Judicial Plan 2011</th>
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<tbody>
<tr>
<td></td>
<td>Normal Retirement Pattern</td>
<td>Early Retirement Pattern</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>55</td>
<td>20%</td>
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<tr>
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<tr>
<td>70</td>
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<td>100</td>
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</tbody>
</table>

### Judicial Plan – Separations From Active Employment Before Service Retirement and Individual Pay Increase Assumptions | June 30, 2017

<table>
<thead>
<tr>
<th>Sample Ages</th>
<th>Percent of Active Members Separating Within the Next Year</th>
<th>Pay Increase Assumptions for an Individual Employee</th>
<th>Percent of Active Members Separating Within the Next Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Death</td>
<td>Disability</td>
<td>Merit and Seniority</td>
</tr>
<tr>
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<td>0.01%</td>
<td>0.01%</td>
</tr>
<tr>
<td>30</td>
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<td>35</td>
<td>0.04</td>
<td>0.03</td>
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<td>40</td>
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<td>50</td>
<td>0.13</td>
<td>0.09</td>
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<td>55</td>
<td>0.24</td>
<td>0.16</td>
<td>0.13</td>
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<td>60</td>
<td>0.42</td>
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<td>65</td>
<td>0.74</td>
<td>0.33</td>
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<tr>
<td>70</td>
<td>1.23</td>
<td>0.55</td>
<td>0.20</td>
</tr>
</tbody>
</table>
Miscellaneous Technical Assumptions – June 30, 2017

- **Form of payment**
  - **MSEP**
    - 50% joint and survivor
  - **MSEP 2000/MSEP 2011**
    - Straight life annuity

- **Judicial Plan**
  - Hired before January 1, 2011 – 50% joint and survivor
  - Hired on or after January 1, 2011 – Straight life annuity

- **Marital status**
  - **MSEP/MSEP 2000/MSEP 2011**
    - Percent married – 70% married at retirement, 60% of those dying in active service are married
    - Spouse’s age – Females assumed to be three years younger than males.
  - **Judicial Plan**
    - Percent married – 100% married
    - Spouse’s age – Females assumed to be four years younger than males.

- **Pay increase timing** – Beginning of the fiscal year.

- **Decrement timing** – Decrement of all types are assumed to occur mid-year.

- **Eligibility testing** – Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.

- **Benefit service** – Exact fractional service is used to determine the amount of the benefit payable.

- **Decrement relativity** – Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.

- **Decrement operation** – Disability and withdrawal do not operate during normal retirement eligibility.

- **Other liability adjustments**
  - **MSEP/MSEP 2000/MSEP 2011**
    - Pre-Retirement survivor benefits for spouse of terminated-vested member. These factors are used to estimate the cost of immediate unreduced survivor annuities upon the death of a vested member.

- **Incidence of contributions** – Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report, and the actual payroll payable at the time contributions are made. New entrant normal cost contributions are applied to the funding of new entrant benefits.

- **Retirement election**
  - **MSEP 2000**
    - All regular state employees hired on or before June 30, 2000 are assumed to elect MSEP 2000 prior to age 62 and MSEP on or after age 62.
    - Elected officials, general assembly, and uniformed water patrol members hired before July 1, 2000 and administrative law judges hired before April 26, 2005 are assumed to elect MSEP at retirement.

<table>
<thead>
<tr>
<th>Age</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;30</td>
<td>1.57</td>
<td>1.31</td>
</tr>
<tr>
<td>30-39</td>
<td>1.24</td>
<td>1.13</td>
</tr>
<tr>
<td>40-49</td>
<td>1.09</td>
<td>1.05</td>
</tr>
<tr>
<td>&gt;50</td>
<td>1.02</td>
<td>1.01</td>
</tr>
</tbody>
</table>
• Service adjustment

  **MSEP/MSEP 2000/MSEP 2011**
  – It is assumed that each member will be granted eight months of service credit, four months for unused leave upon retirement and four months for military service purchases.

  **MSEP 2011**
  – For members hired on or after January 1, 2011 it is assumed that each member will be granted five months for unused leave.

• Forfeitures

  **MSEP 2011**
  – For those hired on or after January 1, 2011, 50% of state employees terminating at first vesting eligibility are assumed to take a refund and forfeit their deferred pension. This percentage decreases to 0% at first retirement eligibility.

• **Judicial Plan**
  – No vested members are assumed to take a refund of employee contributions.

• **Salary and benefit limits** – For purposes of the valuation, no limits were applied to member compensation or benefits.

• **Commencement age for deferred vested benefit** – normal retirement date

• **Data Adjustments**

  **MSEP/MSEP 2000/MSEP 2011**
  Active and retired member data was reported as of May 31, 2017. It was brought forward to June 30, 2017 by adding one month of service for all active members and the June COLA for certain retired members. Financial information continues to be reported as of June 30. This procedure was instituted to provide sufficient time for the board of trustees to certify the appropriate contribution rate prior to the statutory deadline.

  Active members reported with less than a $100 annualized salary were assumed to receive the average active member pay.

  When the option of choosing plans is available, terminated-vested members are reported with two records, one with benefits under the MSEP and one with benefits under the MSEP 2000. Because it is unknown what the member will elect at retirement, both records are valued and the plan that produces the higher present value of future benefits is used for valuation purposes.

  For any retired member who has elected a joint and survivor benefit, yet has no beneficiary date of birth provided, it was assumed that the beneficiary is three years younger for male retirees and three years older for female retirees.

  For members reported with no gender, the member is assumed to be male.

  Due to limitations in our valuation program, members who are not eligible for normal retirement prior to age 85 had their date of birth adjusted.

  **Judicial Plan**
  Active and retired member data was reported as of May 31, 2017. It was brought forward to June 30, 2017 by adding one month of service for all active members and the June COLA for certain retired members. Financial information continues to be reported as of June 30. This procedure was instituted to provide sufficient time for the board of trustees to certify the appropriate contribution rate prior to the statutory deadline.

  Active members reported no annualized salary were assumed to receive the average active member pay.

**Other Technical Valuation Procedures**

Salary increases are assumed to apply to annual amounts.

Decrements are assumed to occur mid-year, except that immediate retirement is assumed for those who are at or older than the age at which retirement rates are 100%. Standard adjustments are made for multiple decrements.

No actuarial liability is included for participants who terminated without being vested prior to the valuation date, except those due a refund of contributions.
MOSES uses the entry-age normal actuarial cost method which allocates the actuarial present value of each member’s projected benefits on a level basis over the member’s pensionable compensation between the entry age of the member and assumed exit ages.

### MSEP

<table>
<thead>
<tr>
<th>Actuarial Valuation Date</th>
<th>Actuarial Value of Assets (a)</th>
<th>Actuarial Accrued Liability (AAL) (b)</th>
<th>Unfunded AAL (UAAL) (b-a)</th>
<th>Percent Funded (a/b)</th>
<th>Annual Covered Payroll (c)</th>
<th>UAAL Percentage of Covered Payroll [(b-a)/c]</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/30/2008</td>
<td>$7,838,495,768</td>
<td>$9,128,347,470</td>
<td>$1,289,851,702</td>
<td>85.9%</td>
<td>$1,916,527,398</td>
<td>67.3%</td>
</tr>
<tr>
<td>6/30/2009</td>
<td>7,876,079,342</td>
<td>9,494,806,715</td>
<td>1,618,727,373</td>
<td>83.0%</td>
<td>2,002,402,087</td>
<td>80.8</td>
</tr>
<tr>
<td>6/30/2010</td>
<td>7,923,377,393</td>
<td>9,853,155,445</td>
<td>1,929,778,052</td>
<td>80.4%</td>
<td>1,945,095,321</td>
<td>99.2</td>
</tr>
<tr>
<td>6/30/2011</td>
<td>8,022,481,408</td>
<td>10,123,544,043</td>
<td>2,101,062,635</td>
<td>79.2%</td>
<td>1,875,569,816</td>
<td>112.0</td>
</tr>
<tr>
<td>6/30/2012</td>
<td>7,897,167,203</td>
<td>10,793,651,577</td>
<td>2,896,484,374</td>
<td>73.2%</td>
<td>1,864,069,493</td>
<td>155.4</td>
</tr>
<tr>
<td>6/30/2013</td>
<td>8,096,436,929</td>
<td>11,134,637,484</td>
<td>3,038,200,555</td>
<td>72.7%</td>
<td>1,880,212,950</td>
<td>161.6</td>
</tr>
<tr>
<td>6/30/2014</td>
<td>8,637,758,955</td>
<td>11,494,571,835</td>
<td>2,856,812,880</td>
<td>75.1%</td>
<td>1,902,719,928</td>
<td>150.1</td>
</tr>
<tr>
<td>6/30/2015</td>
<td>8,792,485,658</td>
<td>11,727,618,410</td>
<td>2,935,132,752</td>
<td>75.0%</td>
<td>1,918,527,768</td>
<td>153.0</td>
</tr>
<tr>
<td>6/30/2016</td>
<td>8,878,057,191</td>
<td>12,751,162,753</td>
<td>3,873,105,562</td>
<td>69.6%</td>
<td>1,921,528,936</td>
<td>201.6</td>
</tr>
<tr>
<td>6/30/2017</td>
<td>8,872,381,848</td>
<td>13,152,273,895</td>
<td>4,279,892,047</td>
<td>67.5%</td>
<td>1,941,969,786</td>
<td>220.4</td>
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</tbody>
</table>

### Judicial Plan

<table>
<thead>
<tr>
<th>Actuarial Valuation Date</th>
<th>Actuarial Value of Assets (a)</th>
<th>Actuarial Accrued Liability (AAL) (b)</th>
<th>Unfunded AAL (UAAL) (b-a)</th>
<th>Percent Funded (a/b)</th>
<th>Annual Covered Payroll (c)</th>
<th>UAAL Percentage of Covered Payroll [(b-a)/c]</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/30/2008</td>
<td>$73,194,379</td>
<td>$354,796,453</td>
<td>$281,602,074</td>
<td>20.6%</td>
<td>$44,542,530</td>
<td>632.2%</td>
</tr>
<tr>
<td>6/30/2009</td>
<td>81,337,881</td>
<td>369,106,841</td>
<td>287,768,960</td>
<td>22.0%</td>
<td>45,505,512</td>
<td>632.4</td>
</tr>
<tr>
<td>6/30/2010</td>
<td>88,976,738</td>
<td>382,012,773</td>
<td>293,036,035</td>
<td>23.3%</td>
<td>46,112,730</td>
<td>635.5</td>
</tr>
<tr>
<td>6/30/2011</td>
<td>98,398,628</td>
<td>393,484,589</td>
<td>295,085,961</td>
<td>25.0%</td>
<td>45,888,020</td>
<td>643.1</td>
</tr>
<tr>
<td>6/30/2012</td>
<td>102,266,706</td>
<td>413,322,538</td>
<td>311,065,832</td>
<td>24.7%</td>
<td>45,835,501</td>
<td>678.7</td>
</tr>
<tr>
<td>6/30/2013</td>
<td>111,140,339</td>
<td>435,378,358</td>
<td>324,238,019</td>
<td>25.5%</td>
<td>48,697,726</td>
<td>665.8</td>
</tr>
<tr>
<td>6/30/2014</td>
<td>124,269,105</td>
<td>462,336,255</td>
<td>338,067,150</td>
<td>26.9%</td>
<td>49,587,936</td>
<td>681.8</td>
</tr>
<tr>
<td>6/30/2015</td>
<td>134,349,908</td>
<td>482,969,311</td>
<td>348,619,403</td>
<td>27.8%</td>
<td>55,656,457</td>
<td>626.4</td>
</tr>
<tr>
<td>6/30/2016</td>
<td>143,468,860</td>
<td>547,621,617</td>
<td>404,152,575</td>
<td>26.2%</td>
<td>57,421,016</td>
<td>703.8</td>
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<tr>
<td>6/30/2017</td>
<td>151,828,631</td>
<td>564,417,925</td>
<td>412,589,294</td>
<td>26.9%</td>
<td>58,150,935</td>
<td>709.5</td>
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</table>

See Required Schedule of Employer Contributions on page 53.  
See accompanying Independent Auditors’ Report.
### Active Members

<table>
<thead>
<tr>
<th>Valuation Group</th>
<th>Number</th>
<th>Payroll</th>
<th>Group Averages</th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>MSEP</td>
<td></td>
<td></td>
<td></td>
<td>Salary</td>
<td>Age (Yrs.)</td>
<td>Service (Yrs.)</td>
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<tr>
<td>Regular state employees</td>
<td>46,219</td>
<td>$1,785,837,129</td>
<td>$38,639</td>
<td>45.1</td>
<td>10.7</td>
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<tr>
<td>Elected officials</td>
<td>6</td>
<td>659,985</td>
<td>109,998</td>
<td>44.0</td>
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<tr>
<td>Legislative clerks</td>
<td>11</td>
<td>381,400</td>
<td>34,673</td>
<td>65.5</td>
<td>19.6</td>
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<tr>
<td>Legislators</td>
<td>193</td>
<td>6,941,688</td>
<td>69,744</td>
<td>41.0</td>
<td>15.2</td>
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<tr>
<td>Uniformed water patrol</td>
<td>10</td>
<td>697,444</td>
<td>35,967</td>
<td>51.7</td>
<td>4.8</td>
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<tr>
<td>Conservation department</td>
<td>1,373</td>
<td>61,206,748</td>
<td>77,731</td>
<td>57.7</td>
<td>21.8</td>
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<tr>
<td>School-term salaried employees</td>
<td>1,076</td>
<td>83,638,379</td>
<td>44,579</td>
<td>44.3</td>
<td>14.1</td>
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<tr>
<td>Administrative law judges</td>
<td>22</td>
<td>2,607,013</td>
<td>118,501</td>
<td>59.8</td>
<td>22.7</td>
<td></td>
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<tr>
<td>Total MSEP group</td>
<td>48,910</td>
<td>$1,941,969,786</td>
<td></td>
<td>39,705</td>
<td>45.4</td>
<td>11.0</td>
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</table>

<table>
<thead>
<tr>
<th>Judicial Plan</th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<tbody>
<tr>
<td>410</td>
<td>$58,150,935</td>
<td>$141,832</td>
<td>67.6</td>
<td>11.8</td>
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</table>

### Retired Lives

<table>
<thead>
<tr>
<th>Type of Benefit Payment</th>
<th>Number</th>
<th>Annual Benefits</th>
<th>Group Averages</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MSEP</td>
<td></td>
<td></td>
<td></td>
<td>Benefit</td>
<td>Age (Yrs.)</td>
<td></td>
</tr>
<tr>
<td>Retirement</td>
<td>41,362</td>
<td>$649,445,064</td>
<td>$15,701</td>
<td>69.7</td>
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<tr>
<td>Disability</td>
<td>3</td>
<td>11,496</td>
<td>3,832</td>
<td>63.7</td>
<td></td>
<td></td>
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<tr>
<td>Survivor of active member</td>
<td>1,686</td>
<td>18,185,640</td>
<td>10,786</td>
<td>62.9</td>
<td></td>
<td></td>
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<tr>
<td>Survivor of retired member</td>
<td>3,509</td>
<td>42,554,004</td>
<td>12,127</td>
<td>75.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total MSEP group</td>
<td>46,560</td>
<td>$710,196,204</td>
<td>15,253</td>
<td>70.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Judicial Plan                 |        |                |                | $61,945  | 75.8     |

### Others

<table>
<thead>
<tr>
<th>Group</th>
<th>Terminated-Vested</th>
<th>Terminated-Nonvested</th>
<th>Leave of Absence</th>
<th>Long-Term Disability</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSEP</td>
<td>19,578</td>
<td>3,899</td>
<td>178</td>
<td>849</td>
</tr>
<tr>
<td>Judicial Plan</td>
<td>25</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
### Active Members by Attained Age and Years of Service | June 30, 2017

#### MSEP

<table>
<thead>
<tr>
<th>Attained Age</th>
<th>0-4</th>
<th>5-9</th>
<th>10-14</th>
<th>15-19</th>
<th>20-24</th>
<th>25-29</th>
<th>30-34</th>
<th>35+</th>
<th>No.</th>
<th>Valuation Payroll</th>
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<tbody>
<tr>
<td>&lt; 24</td>
<td>2,327</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2,336</td>
<td>$66,852,920</td>
</tr>
<tr>
<td>25-29</td>
<td>3,988</td>
<td>541</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4,547</td>
<td>151,045,244</td>
</tr>
<tr>
<td>30-34</td>
<td>2,808</td>
<td>1,529</td>
<td>525</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4,874</td>
<td>178,131,868</td>
</tr>
<tr>
<td>35-39</td>
<td>2,059</td>
<td>1,363</td>
<td>1,338</td>
<td>539</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td>5,315</td>
<td>204,999,372</td>
</tr>
<tr>
<td>40-44</td>
<td>1,554</td>
<td>1,062</td>
<td>1,082</td>
<td>1,331</td>
<td>456</td>
<td>14</td>
<td></td>
<td></td>
<td>5,499</td>
<td>222,347,386</td>
</tr>
<tr>
<td>45-49</td>
<td>1,575</td>
<td>1,051</td>
<td>981</td>
<td>1,367</td>
<td>1,311</td>
<td>419</td>
<td>43</td>
<td></td>
<td>6,747</td>
<td>277,262,442</td>
</tr>
<tr>
<td>50-54</td>
<td>1,352</td>
<td>995</td>
<td>974</td>
<td>1,277</td>
<td>1,149</td>
<td>931</td>
<td>365</td>
<td>24</td>
<td>7,067</td>
<td>297,356,254</td>
</tr>
<tr>
<td>55-59</td>
<td>1,166</td>
<td>912</td>
<td>930</td>
<td>1,254</td>
<td>979</td>
<td>663</td>
<td>444</td>
<td>155</td>
<td>6,503</td>
<td>274,084,255</td>
</tr>
<tr>
<td>60-64</td>
<td>639</td>
<td>663</td>
<td>728</td>
<td>892</td>
<td>588</td>
<td>408</td>
<td>225</td>
<td>151</td>
<td>4,294</td>
<td>187,269,704</td>
</tr>
<tr>
<td>65+</td>
<td>184</td>
<td>288</td>
<td>300</td>
<td>348</td>
<td>214</td>
<td>145</td>
<td>103</td>
<td>146</td>
<td>1,728</td>
<td>82,620,341</td>
</tr>
<tr>
<td>Totals</td>
<td>17,652</td>
<td>8,413</td>
<td>6,876</td>
<td>7,020</td>
<td>4,713</td>
<td>2,580</td>
<td>1,180</td>
<td>476</td>
<td>48,910</td>
<td>$1,941,969,786</td>
</tr>
</tbody>
</table>

While not used in the financial computations, the following group averages are computed and shown because of their general interest.

**Group Averages:** Age — 45.4 years • Service — 11 years • Annual pay — $39,705

#### Judicial Plan

<table>
<thead>
<tr>
<th>Attained Age</th>
<th>0-4</th>
<th>5-9</th>
<th>10-14</th>
<th>15-19</th>
<th>20-24</th>
<th>25-29</th>
<th>30+</th>
<th>No.</th>
<th>Valuation Payroll</th>
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<td>8</td>
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<td>4</td>
<td>5</td>
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<td>78</td>
<td>76</td>
<td>62</td>
<td>49</td>
<td>15</td>
<td>15</td>
<td>410</td>
<td>$58,150,935</td>
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</table>

While not used in the financial computations, the following group averages are computed and shown because of their general interest.

**Group Averages:** Age — 56.6 years • Service — 11.8 years • Annual pay — $141,832
## Schedules of Active Member Valuation Data | Ten Years Ended June 30, 2017

### MSEP

<table>
<thead>
<tr>
<th>Valuation Date</th>
<th>Number</th>
<th>Annual Payroll</th>
<th>Annual Average Pay</th>
<th>% Increase in Average Pay</th>
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<tbody>
<tr>
<td>June 30, 2008</td>
<td>54,542</td>
<td>$1,916,527,398</td>
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<td>55,057</td>
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<td>51,660</td>
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<tr>
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<td>38,847</td>
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<tr>
<td>June 30, 2017</td>
<td>48,910</td>
<td>1,941,969,786</td>
<td>39,705</td>
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### Judicial Plan

<table>
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<th>Number</th>
<th>Annual Payroll</th>
<th>Annual Average Pay</th>
<th>% Increase in Average Pay</th>
</tr>
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### Retirees and Beneficiaries Added and Removed | Ten Years Ended June 30, 2017*

**MSEP**

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<th>Fiscal Year Ended</th>
<th>Classification</th>
<th>Benefit Type</th>
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<th>Number</th>
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* Schedule is intended to show information for 10 years. Additional years will be displayed as they become available.
### Rolls at End of Year

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<tr>
<th>Number</th>
<th>Annual Allowances</th>
<th>Percentage Increase (Decrease) in Annual Allowances</th>
<th>Average Annual Allowances</th>
<th>Percentage Increase (Decrease) in Average Annual Allowances</th>
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| 10     | 258,059           | (8.87)                                                 | 25,806                    | 0.24                                                        


Other Actuarial Section information reported based on MOSERS data as of May 31, 2017.
### Retirees and Beneficiaries Added and Removed continued from pages 100-101.

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* Schedule is intended to show information for 10 years. Additional years will be displayed as they become available.*
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* Schedule is intended to show information for 10 years. Additional years will be displayed as they become available.*
## Rolls at End of Year

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<th>Number</th>
<th>Annual Allowances</th>
<th>Percentage Increase (Decrease) in Annual Allowances</th>
<th>Average Annual Allowances</th>
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### Judicial Plan

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*Schedule is intended to show information for 10 years. Additional years will be displayed as they become available.*
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<th>Number</th>
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<th>Percentage Increase (Decrease) in Annual Allowances</th>
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<td>30,466</td>
<td>0.91</td>
</tr>
<tr>
<td>104</td>
<td>3,406,291</td>
<td>(1.13)</td>
<td>32,753</td>
<td>3.62</td>
</tr>
<tr>
<td>356</td>
<td>22,365,845</td>
<td>1.90</td>
<td>62,825</td>
<td>0.75</td>
</tr>
<tr>
<td>34</td>
<td>1,058,544</td>
<td>2.19</td>
<td>31,134</td>
<td>2.19</td>
</tr>
<tr>
<td>106</td>
<td>3,559,603</td>
<td>4.50</td>
<td>33,581</td>
<td>2.53</td>
</tr>
<tr>
<td>370</td>
<td>23,747,431</td>
<td>6.18</td>
<td>64,182</td>
<td>2.16</td>
</tr>
<tr>
<td>33</td>
<td>1,053,358</td>
<td>(0.49)</td>
<td>31,920</td>
<td>2.52</td>
</tr>
<tr>
<td>102</td>
<td>3,625,723</td>
<td>1.03</td>
<td>34,863</td>
<td>3.82</td>
</tr>
<tr>
<td>380</td>
<td>24,975,291</td>
<td>5.17</td>
<td>65,724</td>
<td>2.40</td>
</tr>
<tr>
<td>35</td>
<td>1,119,630</td>
<td>6.29</td>
<td>31,989</td>
<td>0.22</td>
</tr>
<tr>
<td>104</td>
<td>3,663,027</td>
<td>1.03</td>
<td>35,912</td>
<td>3.01</td>
</tr>
<tr>
<td>398</td>
<td>25,951,423</td>
<td>9.28</td>
<td>65,205</td>
<td>1.59</td>
</tr>
<tr>
<td>35</td>
<td>1,087,702</td>
<td>3.26</td>
<td>31,077</td>
<td>(2.64)</td>
</tr>
<tr>
<td>115</td>
<td>4,132,819</td>
<td>13.99</td>
<td>35,938</td>
<td>3.08</td>
</tr>
<tr>
<td>400</td>
<td>26,544,151</td>
<td>2.28</td>
<td>66,360</td>
<td>1.77</td>
</tr>
<tr>
<td>34</td>
<td>1,059,742</td>
<td>(2.57)</td>
<td>31,169</td>
<td>0.30</td>
</tr>
<tr>
<td>113</td>
<td>4,147,543</td>
<td>0.36</td>
<td>36,704</td>
<td>2.13</td>
</tr>
<tr>
<td>405</td>
<td>27,432,667</td>
<td>3.35</td>
<td>67,735</td>
<td>2.07</td>
</tr>
<tr>
<td>34</td>
<td>1,069,594</td>
<td>0.93</td>
<td>31,459</td>
<td>0.93</td>
</tr>
<tr>
<td>123</td>
<td>4,557,115</td>
<td>9.88</td>
<td>37,050</td>
<td>0.94</td>
</tr>
</tbody>
</table>
### Short-Term Solvency Test | Ten Years Ended June 30, 2017

#### MSEP

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Member Contributions*</th>
<th>Current Retirees and Beneficiaries</th>
<th>Active and Inactive Members, Employer Financed Portion</th>
<th>Actuarial Value of Assets Available for Benefits</th>
<th>Percentage of Actuarial Liabilities Covered by Actuarial Value of Assets Available for Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>2008</td>
<td>$0</td>
<td>$4,408,682,437</td>
<td>$4,719,665,033</td>
<td>$7,838,495,768</td>
<td>100.0%</td>
</tr>
<tr>
<td>2009</td>
<td>0</td>
<td>4,737,859,976</td>
<td>4,756,946,739</td>
<td>7,876,079,342</td>
<td>100.0</td>
</tr>
<tr>
<td>2010</td>
<td>0</td>
<td>5,012,677,769</td>
<td>4,840,477,676</td>
<td>7,923,377,393</td>
<td>100.0</td>
</tr>
<tr>
<td>2011</td>
<td>599,761</td>
<td>5,357,794,617</td>
<td>4,765,149,665</td>
<td>8,022,481,408</td>
<td>100.0</td>
</tr>
<tr>
<td>2012</td>
<td>5,431,451</td>
<td>5,749,411,068</td>
<td>5,038,809,058</td>
<td>7,897,167,203</td>
<td>100.0</td>
</tr>
<tr>
<td>2013</td>
<td>14,507,994</td>
<td>6,062,654,441</td>
<td>5,057,475,049</td>
<td>8,096,436,929</td>
<td>100.0</td>
</tr>
<tr>
<td>2014</td>
<td>27,111,467</td>
<td>6,347,728,717</td>
<td>5,119,731,651</td>
<td>8,637,758,955</td>
<td>100.0</td>
</tr>
<tr>
<td>2015</td>
<td>42,731,658</td>
<td>6,695,631,737</td>
<td>4,989,255,015</td>
<td>8,792,485,658</td>
<td>100.0</td>
</tr>
<tr>
<td>2016</td>
<td>60,618,379</td>
<td>7,305,895,284</td>
<td>5,384,649,090</td>
<td>8,878,057,191</td>
<td>100.0</td>
</tr>
<tr>
<td>2017</td>
<td>78,979,370</td>
<td>7,559,623,100</td>
<td>5,513,671,425</td>
<td>8,872,381,848</td>
<td>100.0</td>
</tr>
</tbody>
</table>

#### Judicial Plan

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Member Contributions*</th>
<th>Current Retirees and Beneficiaries</th>
<th>Active and Inactive Members, Employer Financed Portion</th>
<th>Actuarial Value of Assets Available for Benefits</th>
<th>Percentage of Actuarial Liabilities Covered by Actuarial Value of Assets Available for Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>2008</td>
<td>$0</td>
<td>$216,369,879</td>
<td>$138,426,574</td>
<td>$73,194,379</td>
<td>100.0%</td>
</tr>
<tr>
<td>2009</td>
<td>0</td>
<td>231,505,591</td>
<td>137,601,250</td>
<td>81,337,881</td>
<td>100.0</td>
</tr>
<tr>
<td>2010</td>
<td>0</td>
<td>236,113,077</td>
<td>145,892,277</td>
<td>88,976,738</td>
<td>100.0</td>
</tr>
<tr>
<td>2011</td>
<td>59,958</td>
<td>251,532,354</td>
<td>141,892,277</td>
<td>98,398,628</td>
<td>100.0</td>
</tr>
<tr>
<td>2012</td>
<td>209,817</td>
<td>258,642,149</td>
<td>154,480,572</td>
<td>102,266,706</td>
<td>100.0</td>
</tr>
<tr>
<td>2013</td>
<td>421,753</td>
<td>274,911,416</td>
<td>160,045,189</td>
<td>111,140,339</td>
<td>100.0</td>
</tr>
<tr>
<td>2014</td>
<td>716,564</td>
<td>285,124,436</td>
<td>176,495,255</td>
<td>124,269,105</td>
<td>100.0</td>
</tr>
<tr>
<td>2015</td>
<td>1,204,757</td>
<td>316,042,514</td>
<td>165,722,040</td>
<td>134,349,908</td>
<td>100.0</td>
</tr>
<tr>
<td>2016</td>
<td>1,855,955</td>
<td>354,715,048</td>
<td>191,050,614</td>
<td>143,468,860</td>
<td>100.0</td>
</tr>
<tr>
<td>2017</td>
<td>2,232,405</td>
<td>377,099,534</td>
<td>185,085,986</td>
<td>151,828,631</td>
<td>100.0</td>
</tr>
</tbody>
</table>

* Prior year member contribution amounts have been corrected from previous reports.
Analysis of Financial Experience | Year Ended June 30, 2017

Actual experience will never coincide exactly with assumed experience (except by coincidence). Gains and losses may offset each other over a period of years, but sizable year-to-year variations from assumed experience are common. Detail on the analysis of the financial experience is shown below.

### MSEP

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Year Ended June 30, 2017</th>
<th>Valuation Date</th>
<th>Actuarial Gain (Loss) as a % of Beginning Accrued Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>$ Millions</td>
<td>$ Millions</td>
<td>June 30</td>
<td></td>
</tr>
<tr>
<td>Unfunded actuarial accrued liability (UAAL) at beginning of year</td>
<td>$3,873.1</td>
<td>2008</td>
<td>0.1%</td>
</tr>
<tr>
<td>Normal cost from last valuation</td>
<td>141.9</td>
<td>2009</td>
<td>(5.2)</td>
</tr>
<tr>
<td>Actual employer contributions</td>
<td>(360.7)</td>
<td>2010</td>
<td>(4.0)</td>
</tr>
<tr>
<td>Administrative expenses</td>
<td>8.8</td>
<td>2011</td>
<td>(2.4)</td>
</tr>
<tr>
<td>Interest accrual</td>
<td>293.9</td>
<td>2012</td>
<td>(4.7)</td>
</tr>
<tr>
<td>Expected UAAL before changes</td>
<td>3,957.0</td>
<td>2013</td>
<td>(2.8)</td>
</tr>
<tr>
<td>Change from any changes in benefits, assumptions, or methods</td>
<td>112.4</td>
<td>2014</td>
<td>2.1</td>
</tr>
<tr>
<td>Expected UAAL after changes</td>
<td>4,069.4</td>
<td>2015</td>
<td>(0.9)</td>
</tr>
<tr>
<td>Less: Actual UAAL at end of year</td>
<td>(4,279.9)</td>
<td>2016</td>
<td>(3.2)</td>
</tr>
<tr>
<td>Gain (loss)</td>
<td>(210.5)</td>
<td>2017</td>
<td>(1.6)</td>
</tr>
</tbody>
</table>

Gain (loss) as a percent of expected accrued liabilities ($13,062) (1.6)%

### Judicial Plan

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Year Ended June 30, 2017</th>
<th>Valuation Date</th>
<th>Actuarial Gain (Loss) as a % of Beginning Accrued Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>$ Millions</td>
<td>$ Millions</td>
<td>June 30</td>
<td></td>
</tr>
<tr>
<td>Unfunded actuarial accrued liability (UAAL) at beginning of year</td>
<td>$404.2</td>
<td>2008</td>
<td>(3.0)%</td>
</tr>
<tr>
<td>Normal cost from last valuation</td>
<td>12.0</td>
<td>2009</td>
<td>(1.8)</td>
</tr>
<tr>
<td>Actual employer contributions</td>
<td>(35.0)</td>
<td>2010</td>
<td>(1.1)</td>
</tr>
<tr>
<td>Administrative expenses</td>
<td>0.2</td>
<td>2011</td>
<td>(0.4)</td>
</tr>
<tr>
<td>Interest accrual</td>
<td>30.5</td>
<td>2012</td>
<td>(0.6)</td>
</tr>
<tr>
<td>Expected UAAL before changes</td>
<td>411.9</td>
<td>2013</td>
<td>(2.6)</td>
</tr>
<tr>
<td>Change from any changes in benefits, assumptions, or methods</td>
<td>(0.9)</td>
<td>2014</td>
<td>1.5</td>
</tr>
<tr>
<td>Expected UAAL after changes</td>
<td>411.0</td>
<td>2015</td>
<td>(1.5)</td>
</tr>
<tr>
<td>Less: Actual UAAL at end of year</td>
<td>(412.6)</td>
<td>2016</td>
<td>0.1</td>
</tr>
<tr>
<td>Gain (loss)</td>
<td>(1.6)</td>
<td>2017</td>
<td>(0.3)</td>
</tr>
</tbody>
</table>

Gain (loss) as a percent of expected accrued liabilities ($567) (0.3)%
### Comparison of Plans for General State Employees | June 30, 2017

#### MSEP

<table>
<thead>
<tr>
<th>Benefit Provisions</th>
<th>MSEP (closed plan)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Membership eligibility</td>
<td>• Employed prior to July 1, 2000 in a permanent position normally requiring at least 1,040 hours of work per year and vested in MSEP.</td>
</tr>
<tr>
<td>Vesting</td>
<td>• 5 years</td>
</tr>
<tr>
<td>Base benefit formula</td>
<td>• .016 x FAP x service</td>
</tr>
<tr>
<td></td>
<td>• <em>In the past, formula increases have been passed along to MSEP retirees.</em></td>
</tr>
<tr>
<td>Temporary benefit formula</td>
<td>• Not available</td>
</tr>
<tr>
<td>Benefit payment options</td>
<td>• Life income annuity</td>
</tr>
<tr>
<td></td>
<td>• Unreduced joint &amp; 50% survivor</td>
</tr>
<tr>
<td></td>
<td>• Joint &amp; 100% survivor</td>
</tr>
<tr>
<td></td>
<td>• Life income with 60 guaranteed payments</td>
</tr>
<tr>
<td></td>
<td>• Life income with 120 guaranteed payments</td>
</tr>
<tr>
<td>Cost-of-living adjustment (COLA)</td>
<td>• If hired before August 28, 1997, will receive 4-5% each year until reaching the 65% cap. After COLA cap is met the rate is based on 80% of the percentage increase in the average CPI (0-5%).</td>
</tr>
<tr>
<td></td>
<td>• If hired on or after August 28, 1997, annual COLA will be based on 80% of the percentage increase in the average CPI (0-5%).</td>
</tr>
<tr>
<td>Normal retirement eligibility</td>
<td>• Age 65 with 5 years of service</td>
</tr>
<tr>
<td></td>
<td>• Age 60 with 15 years of service</td>
</tr>
<tr>
<td></td>
<td>• &quot;Rule of 80&quot;- at least age 48 with age and service equaling 80 or more</td>
</tr>
<tr>
<td></td>
<td>• <em>Age 50 if first became eligible prior to August 28, 2003</em></td>
</tr>
<tr>
<td>Early retirement eligibility</td>
<td>• Age 55 with 10 years of service</td>
</tr>
<tr>
<td></td>
<td>• Base benefit will be reduced ½ of 1% (.005) for each month member's age is younger than normal retirement.</td>
</tr>
<tr>
<td>Death before retirement</td>
<td>• Non duty-related death <em>(vested members)</em></td>
</tr>
<tr>
<td></td>
<td>- Survivor benefit to eligible spouse calculated using the joint &amp; 100% survivor option or 80% of the member’s life income annuity paid to eligible children.</td>
</tr>
<tr>
<td></td>
<td>• Duty-related death <em>(no minimum service requirement)</em></td>
</tr>
<tr>
<td></td>
<td>- Survivor benefit to eligible spouse or children no less than 50% of average compensation.</td>
</tr>
<tr>
<td>In-service COLA</td>
<td>• COLA given for service beyond age 65. COLA provisions are determined by employment date.</td>
</tr>
<tr>
<td>BackDROP</td>
<td>• Must work at least 2 years beyond normal retirement eligibility to be eligible for BackDROP.</td>
</tr>
<tr>
<td>Service purchases</td>
<td>• May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate. May also purchase qualifying public sector service at full actuarial cost.</td>
</tr>
<tr>
<td>Service transfers</td>
<td>• May transfer state service to other positions covered by MOSERS under 104,800.</td>
</tr>
<tr>
<td>Member contributions</td>
<td>• None</td>
</tr>
</tbody>
</table>
### MSEP 2000

- Employed for the first time on or after July 1, 2000, but prior to January 1, 2011, in a permanent position normally requiring at least 1,040 hours of work per year.
- If left state employment prior to becoming vested and returned to employment on or after July 1, 2000, in a permanent position normally requiring at least 1,040 hours of work per year.
- Employed for the first time on or after January 1, 2011, in a permanent position normally requiring at least 1,040 hours of work per year.
  - 5 years
  - \(0.017 \times \text{FAP} \times \text{service}\)
    - Future formula increases, if any, will not be passed along to retirees.
  - \(0.008 \times \text{FAP} \times \text{service}\)
    - Available to those who retire under the "Rule of 80."
  - Life income annuity
  - Joint & 50% survivor
  - Joint & 100% survivor
  - Life income with 120 guaranteed payments
  - Life income with 180 guaranteed payments
  - Based on 80% of the percentage increase in the average CPI (0-5%).

- Age 62 with 5 years of service
  - "Rule of 80” — at least age 48 with age and service equaling 80 or more
  - Age 50 if first became eligible prior to August 28, 2003
  - Terminated-vested members not eligible for “Rule of 80.”

- Age 57 with 5 years of service
  - Base benefit will be reduced \(\frac{1}{2}\) of 1% (.005) for each month member’s age is younger than normal retirement.

- Non duty-related death (vested members)
  - Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member’s life income annuity paid to eligible children.

- Duty-related death (no minimum service requirement)
  - Survivor benefit to eligible spouse or children no less than 50% of average compensation.

- Not available

- Must work at least 2 years beyond normal retirement eligibility to be eligible for BackDROP.

- May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate. May also purchase qualifying public sector service at full actuarial cost.

- May transfer service under 104.1090 from other systems with written agreements to transfer required funds.

- None

### MSEP 2011

- Employed for the first time on or after January 1, 2011, in a permanent position normally requiring at least 1,040 hours of work per year.
  - 10 years (5 years, effective January 1, 2018)
  - \(0.017 \times \text{FAP} \times \text{service}\)
    - Future formula increases, if any, will not be passed along to retirees.
  - \(0.008 \times \text{FAP} \times \text{service}\)
    - Available to those who retire under the "Rule of 90."
  - Life income annuity
  - Joint & 50% survivor
  - Joint & 100% survivor
  - Life income with 120 guaranteed payments
  - Life income with 180 guaranteed payments
  - Based on 80% of the percentage increase in the average CPI (0-5%).

- Age 67 with 10 years of service
  - “Rule of 90” — at least age 55 with age and service equaling 90 or more
  - Terminated-vested members not eligible for “Rule of 90.”

- Age 62 at the time of termination with 10 years of service
  - Base benefit will be reduced \(\frac{1}{2}\) of 1% (.005) for each month member’s age is younger than normal retirement.
  - Terminated-vested members are not eligible.

- Non duty-related death (vested members)
  - Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member’s life income annuity paid to eligible children.

- Duty-related death (no minimum service requirement)
  - Survivor benefit to eligible spouse or children no less than 50% of average compensation.

- Not available

- May purchase qualifying public sector service at full actuarial cost.

- Not available

- 4% of pay
# Comparison of Plans for Legislators | June 30, 2017

<table>
<thead>
<tr>
<th>Benefit Provisions</th>
<th>MSEP (closed plan)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Membership eligibility</strong></td>
<td>• Elected to the General Assembly and employed prior to July 1, 2000 and vested in MSEP.</td>
</tr>
<tr>
<td><strong>Vesting</strong></td>
<td>• 3 full-biennial assemblies (6 years)</td>
</tr>
</tbody>
</table>
| **Base benefit formula** | • Biennial assemblies x $150  
*In the past, formula increases have been passed along to MSEP retirees.* |
| **Temporary benefit formula** | • Not available |
| **Benefit payment options** | • Life income annuity  
• *Unreduced* joint & 50% survivor  
• Joint & 100% survivor  
• Life income with 60 guaranteed payments  
• Life income with 120 guaranteed payments |
| **Cost-of-living adjustment (COLA)** | • If sworn in before August 28, 1997, will receive 4-5% each year until reaching 65% cap. After COLA cap is met the rate is based on 80% of the percentage increase in the average CPI (0-5%).  
• If sworn in on or after August 28, 1997, COLA will be based on 80% of the percentage increase in the average CPI (0-5%). |
| **Normal retirement eligibility** | • Age 55 with 3 full-biennial assemblies or  
• “Rule of 80” — at least age 48 with age and service equaling 80 or more |
| **Early retirement eligibility** | • Not available |
| **Death before retirement** | • Non duty-related death *(vested members)*  
  – Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member’s life income annuity paid to eligible children.  
• Duty-related death *(no minimum service requirement)*  
  – Survivor benefit to eligible spouse or children no less than 50% of the rate of compensation. |
| **In-service COLA** | • COLA given for service beyond age 65. COLA provisions are determined by employment date. |
| **BackDROP** | • Not available |
| **Service purchases** | • May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate. May also purchase qualifying public sector service at full actuarial cost. |
| **Service transfers** | • May transfer state service to other positions covered by MOSERS under 104.800. |
| **Member contributions** | • None |
### MSEP 2000
- Elected to the General Assembly and employed on or after July 1, 2000, but prior to January 1, 2011
- 3 full-biennial assemblies (6 years)
  - (Active legislator’s pay + 24) x service <br>  *Capped at 100% of pay; future formula increases, if any, will not be passed along to retirees.*
- Not available
- Life income annuity
- Joint & 50% survivor
- Joint & 100% survivor
- Life income with 120 guaranteed payments
- Life income with 180 guaranteed payments
- Benefit adjustment based on increase in pay for an active member of the general assembly.
- Age 55 with 3 full-biennial assemblies or<br>  "Rule of 80" — at least age 50 with age and service equaling 80 or more<br>  *Terminated-vested members not eligible for "Rule of 80."*
- Not available
- Non duty-related death *(vested members)*
  - Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member’s life income annuity paid to eligible children.
- Duty-related death *(no minimum service requirement)*
  - Survivor benefit to eligible spouse or children no less than 50% of rate of compensation.
- Not available
- Not available
- May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate. May also purchase qualifying public sector service at full actuarial cost.
- May transfer service under 104.1090 from other systems with written agreements to transfer required funds.
- None

### MSEP 2011
- Elected to the General Assembly and first employed in a benefit-eligible position on or after January 1, 2011
- 3 full-biennial assemblies (6 years)
  - (Active legislator’s pay + 24) x service <br>  *Capped at 100% of pay; future formula increases, if any, will not be passed along to retirees.*
- Not available
- Life income annuity
- Joint & 50% survivor
- Joint & 100% survivor
- Life income with 120 guaranteed payments
- Life income with 180 guaranteed payments
- Benefit adjustment based on increase in pay for an active member of the general assembly.
- Age 62 at time of termination with 3 full-biennial assemblies or<br>  "Rule of 90" — at least age 55 with age and service equaling 90 or more<br>  *Terminated-vested members not eligible for "Rule of 90."*
- Not available
- Non duty-related death *(vested members)*
  - Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member’s life income annuity paid to eligible children.
- Duty-related death *(no minimum service requirement)*
  - Survivor benefit to eligible spouse or children no less than 50% of rate of compensation.
- Not available
- Not available
- May purchase qualifying public sector service at full actuarial cost.
- Not available
- 4% of pay
## SUMMARY OF PLAN PROVISIONS

### Comparison of Plans for Statewide Elected Officials | June 30, 2017

#### MSEP

<table>
<thead>
<tr>
<th>Benefit Provisions</th>
<th>MSEP (closed plan)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Membership eligibility</strong></td>
<td>• Elected to state office and employed prior to July 1, 2000, and vested in MSEP</td>
</tr>
<tr>
<td><strong>Vesting</strong></td>
<td>• 4 years (1 term)</td>
</tr>
</tbody>
</table>
| **Base benefit formula** | • Less than 12 years of service  
  FAP x .016 x service  
  • 12 or more years of service  
  Monthly statutory compensation x .50  
  *In the past, formula increases have been passed along to MSEP retirees.* |
| **Temporary benefit formula** | • Not available |
| **Benefit payment options** | • Life income annuity  
  • *Unreduced* joint & 50% survivor  
  • Joint & 100% survivor  
  • Life income with 60 guaranteed payments  
  • Life income with 120 guaranteed payments |
| **Cost-of-living adjustment (COLA)** | • Less than 12 years of service  
  – If sworn in before August 28, 1997 will receive 4-5% each year until they reach 65% cap. After COLA cap is met the rate is based on 80% of the percentage increase in the average CPI (0-5%).  
  – If sworn in between August 28, 1997 and June 30, 2000, will receive a COLA equal to 80% of percentage increase in the average CPI (0-5%).  
  • 12 or more years of service  
  – 12 or more years of service will receive a COLA based on increases in statutory compensation for the highest position held.  
  – Sworn in before August 28, 1997 will receive 4-5% each year until they reach 65% cap. After COLA cap is met the rate is based on 80% of the percentage increase in the average CPI (0-5%).  
  – Sworn in between August 28, 1997 and June 30, 2000, will receive a COLA equal to 80% of percentage increase in the average CPI (0-5%). |
| **Normal retirement eligibility** | • Age 60 with 15 years of service or  
  • “Rule of 80” — at least age 50 with age and service equaling 80 or more |
| **Early retirement eligibility** | • Age 55 with 10 years of service |
| **Death before retirement** | • Non duty-related death (*vested members*)  
  – Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member’s life income annuity paid to eligible children.  
  • Duty-related death (*no minimum service requirement*)  
  – Survivor benefit to eligible spouse or children no less than 50% of current pay. |
| **In-service COLA** | • COLA provisions determined by amount of service relative to 12 years and date of employment. |
| **BackDROP** | • Not available |
| **Service purchases** | • May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate. May also purchase qualifying public sector service at full actuarial cost. |
| **Service transfers** | • May transfer state service to other positions covered by MOSERS under 104.800. |
| **Member contributions** | • None |
### MSEP 2000

- Elected to state office and employed for the first time on or after July 1, 2000, but prior to January 1, 2011
- 4 years (1 term)
- \((\text{Active elected official’s pay} + 24) \times \text{service}\)
  
  *Capped at 12 years of service or 50% of pay; future formula increases, if any, will not be passed along to retirees.*

- Not available
- Life income annuity
- Joint & 50% survivor
- Joint & 100% survivor
- Life income with 120 guaranteed payments
- Life income with 180 guaranteed payments
- Benefit adjustment based on increase in pay for an active statewide elected official.

- Age 55 with 4 years of service or
- “Rule of 80” - at least age 50 with age and service equaling 80 or more
  
  *Terminated-vested members not eligible for “Rule of 80.”*

- Not available
- Non duty-related death (vested members)
  - Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member’s life income annuity paid to eligible children.

- Duty-related death (no minimum service requirement)
  - Survivor benefit to eligible spouse or children no less than 50% of current pay.

- Not available
- May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate; may also purchase qualifying public sector service at full actuarial cost.
- May transfer service under 104.1090 from other systems with written agreements to transfer required funds.
- None

### MSEP 2011

- Elected to state office and employed for the first time in a benefit-eligible position on or after January 1, 2011
- 4 years (1 term)
- \((\text{Active elected official’s pay} + 24) \times \text{service}\)
  
  *Capped at 12 years of service or 50% of pay; future formula increases, if any, will not be passed along to retirees.*

- Not available
- Life income annuity
- Joint & 50% survivor
- Joint & 100% survivor
- Life income with 120 guaranteed payments
- Life income with 180 guaranteed payments
- Benefit adjustment based on increase in pay for an active statewide elected official.

- Age 62 at time of termination with 4 years of service or
- “Rule of 90” - at least age 55 with age and service equaling 90 or more
  
  *Terminated-vested members not eligible for “Rule of 90.”*

- Not available
- Non duty-related death (vested members)
  - Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member’s life income annuity paid to eligible children.

- Duty-related death (no minimum service requirement)
  - Survivor benefit to eligible spouse or children no less than 50% of current pay.

- Not available
- May purchase qualifying public sector service at full actuarial cost.
- None
- 4% of pay
Comparison of Plans for Judges  | June 30, 2017

Judicial Plan

<table>
<thead>
<tr>
<th>Benefit Provisions</th>
<th>Judicial Plan (closed plan)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Membership eligibility</td>
<td>• Must be a judge or commissioner of the supreme court or the court of appeals, a judge of the circuit court, probate court, magistrate court, court of common pleas, court of criminal corrections, a justice of the peace, or a commissioner or deputy commissioner of the circuit court appointed after February 29, 1972; a commissioner of the juvenile division of the circuit court appointed pursuant to Section 211.023, RSMo; a commissioner of the drug court pursuant to Section 478.466, RSMo; or a commissioner of the family court.</td>
</tr>
<tr>
<td>Vesting</td>
<td>• Immediate</td>
</tr>
<tr>
<td>Base benefit formula</td>
<td>• Monthly pay x .50 = monthly base benefit</td>
</tr>
<tr>
<td>Temporary benefit formula</td>
<td>• Not available</td>
</tr>
<tr>
<td>Benefit payment options</td>
<td>• Life income annuity</td>
</tr>
</tbody>
</table>
|                             | • Automatic unreduced joint and 50% survivor option  
|                             | If married at least two continuous years immediately preceding judge's death. |
| Cost-of-living adjustment (COLA) | • If hired before August 28, 1997, will receive 4-5% each year until reaching 65% cap. After COLA cap is met the rate is based on 80% of the percentage increase in the average CPI (0-5%)  
|                             | • If hired on or after August 28, 1997, based on 80% of the percentage increase in the average CPI (0-5%). |
| Normal retirement eligibility | • Age 62 with 12 years service  
|                             | • Age 60 with 15 years service  
|                             | • Age 55 with 20 years service |
| Reduced retirement eligibility | • Age 60 if less than 15 years service  
|                             | • Age 62 if less than 12 years service |
| Death before retirement     | • Non duty-related death  
|                             | – Survivor benefit to eligible spouse equal to 50% of the benefit the member would have received based on service to age 70. |
| In-service COLA             | • Judges who are at least age 60 and work beyond the date first eligible for unreduced benefits will receive COLAs for each year worked beyond normal retirement eligibility. COLA provisions are determined by date of employment. |
| BackDROP                    | • Not available             |
| Service purchases           | • May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate. May also purchase qualifying public sector service at full actuarial cost. |
| Service transfers           | • May transfer state service to other positions covered by MOSERS under 104.800. |
| Member contributions        | • None                      |
Judicial Plan 2011

- Must be a judge or commissioner of the supreme court or the court of appeals, a judge of the circuit court, probate court, magistrate court, court of common pleas, court of criminal corrections, a justice of the peace, or a commissioner or deputy commissioner of the circuit court; a commissioner of the juvenile division of the circuit court appointed pursuant to Section 211.023, RSMo; a commissioner of the drug court pursuant to Section 478.466, RSMo; or a commissioner of the family court appointed or elected a judge and employed in a benefit-eligible position as a judge for the first time on or after January 1, 2011.

- Immediate
  - Monthly pay \( \times 0.50 = \) monthly base benefit

- Not available

- Life income annuity
- Joint & 50% survivor
- Joint & 100% survivor
- Life income with 120 guaranteed payments
- Life income with 180 guaranteed payments
- Based on 80% of the percentage increase in the average CPI (0-5%)

- Age 67 with 12 years service
- Age 62 with 20 years service

- Age 67 if less than 12 years service
- Age 62 if less than 20 years service

- Non duty-related death
  - Survivor benefit to eligible spouse equal to 50% of the benefit the member would have received based on service to age 70.

- Not available

- Not available

- May purchase qualifying public sector service at full actuarial cost.

- May transfer state service to other positions covered by MOSERS under 104.800.

- 4% of pay
<table>
<thead>
<tr>
<th>Benefit Provisions</th>
<th>MSEP (closed plan)</th>
<th>MSEP 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Membership eligibility</td>
<td>• Employed prior to July 1, 2000 in a permanent position normally requiring at least 1,040 hours of work a year, and vested in MSEP.</td>
<td>• Employed for the first time on or after July 1, 2000, in a permanent position normally requiring at least 1,040 hours of work a year. Members who left state employment prior to becoming vested and returned to work on or after July 1, 2000, in a permanent position normally requiring at least 1,040 hours of work a year.</td>
</tr>
<tr>
<td>Vesting</td>
<td>• 5 years of service</td>
<td>• 5 years of service</td>
</tr>
<tr>
<td>Base benefit formula</td>
<td>• 1.6% x FAP x service increased by 33.3%</td>
<td>• 1.7% x FAP x service (must retire under &quot;Rule of 80&quot;)</td>
</tr>
<tr>
<td>Temporary benefit formula</td>
<td>• Not available</td>
<td>• Life income annuity</td>
</tr>
<tr>
<td>Benefit payment options</td>
<td>• Life income annuity</td>
<td>• Unreduced joint and 50% survivor</td>
</tr>
<tr>
<td></td>
<td>• Unreduced joint and 50% survivor</td>
<td>• Joint &amp; 100% survivor</td>
</tr>
<tr>
<td></td>
<td>• Joint &amp; 100% survivor</td>
<td>• Joint &amp; 100% survivor</td>
</tr>
<tr>
<td></td>
<td>• 60 or 120 guaranteed payments</td>
<td>• 120 or 180 guaranteed payments</td>
</tr>
<tr>
<td>Cost-of-living adjustment (COLA)</td>
<td>• If hired before August 28, 1997, will receive 4-5% each year until reaching 65% cap. After COLA cap is met, the rate is based on 80% of the percentage increase in the average CPI (0-5%).</td>
<td>• Based on 80% of the percentage increase in the average CPI (0-5%).</td>
</tr>
<tr>
<td>Normal retirement eligibility</td>
<td>• Age 55 with 5 years of service</td>
<td>• Age 62 with 5 years of service</td>
</tr>
<tr>
<td>Early retirement eligibility</td>
<td>• &quot;Rule of 80&quot; - minimum age 48</td>
<td>• &quot;Rule of 80&quot; - minimum age 48</td>
</tr>
<tr>
<td>Death before retirement</td>
<td>• Not available</td>
<td>• Non duty-related death (vested members)</td>
</tr>
<tr>
<td></td>
<td>• Non duty-related death (vested members)</td>
<td>• Survivor benefit to eligible spouse calculated using the joint &amp; 100% survivor option or 80% of the member’s life income annuity paid to eligible children.</td>
</tr>
<tr>
<td></td>
<td>• Duty-related death (no minimum service requirement)</td>
<td>• Duty-related death (no minimum service requirement)</td>
</tr>
<tr>
<td></td>
<td>• Survivor benefit to eligible spouse or children no less than 50% of current pay.</td>
<td>• Survivor benefit to eligible spouse or children no less than 50% of current pay.</td>
</tr>
<tr>
<td>In-service COLA</td>
<td>• COLA given for service beyond age 65. COLA provisions are determined by employment date.</td>
<td>• Not available</td>
</tr>
<tr>
<td>BackDROP</td>
<td>• Must work at least two years beyond normal retirement eligibility to be eligible for BackDROP.</td>
<td>• Must work at least two years beyond normal retirement eligibility to be eligible for BackDROP.</td>
</tr>
<tr>
<td>Service purchases</td>
<td>• May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate. May also purchase qualifying public sector service at full actuarial cost.</td>
<td>• May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate. May also purchase qualifying public sector service at full actuarial cost.</td>
</tr>
<tr>
<td>Service transfers</td>
<td>• May transfer state service to other positions covered by MOSERS under 104.800.</td>
<td>• May transfer state service to other positions covered by MOSERS under 104.1090.</td>
</tr>
<tr>
<td>Member contributions</td>
<td>• None</td>
<td>• None</td>
</tr>
</tbody>
</table>

* Eligibility for membership in the MSEP and MSEP 2000 is closed for uniformed members of the water patrol. Employees hired on or after January 1, 2011, are members of the Missouri Department of Transportation and Patrol Employees’ Retirement System (MPERS).
SUMMARY OF PLAN PROVISIONS

Life Insurance Plans | June 30, 2017

MOSERS administers basic and optional term life insurance plans for eligible state employees and retirees.

Active Members*

<table>
<thead>
<tr>
<th>Plan Provision</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic life insurance</strong> - An amount equal to one times annual salary (with a minimum of $15,000) while actively employed.</td>
<td>• Actively employed in an eligible state position resulting in membership in MOSERS.</td>
</tr>
<tr>
<td><strong>Duty-related death benefit</strong> - Duty-related death benefit equivalent to two times the annual salary the member was earning at the time of death in addition to the basic life insurance amount of one times annual salary.</td>
<td>• Actively employed in an eligible state position resulting in membership in MOSERS.</td>
</tr>
<tr>
<td><strong>Optional life insurance</strong> - Additional life insurance may be purchased in a flat amount in multiples of $10,000 not to exceed the maximum (lesser of six times annual salary or $800,000). Spouse coverage may be purchased in multiples of $10,000 up to a maximum of $100,000; however, the amount of spouse coverage cannot exceed the amount of optional life insurance coverage the member has purchased. Coverage for children is available in a flat amount of $10,000 per child.</td>
<td>• Actively employed in an eligible state position resulting in membership in MOSERS.</td>
</tr>
</tbody>
</table>

*Terminating employees may convert coverage up to the amount they had as an active employee at individual rates. Not available to employees of the Department of Conservation or colleges and universities except Lincoln University and the State Technical College.

Retired Members

<table>
<thead>
<tr>
<th>Plan Provision</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic life insurance at retirement</strong> - $5,000 basic life insurance during retirement.</td>
<td>• Must retire directly from active employment.</td>
</tr>
<tr>
<td><strong>Optional life insurance at retirement (MSEP)</strong> - An employee may retain up to the lesser of $60,000 or the amount of optional life insurance coverage held at the time of retirement at the group rate and may convert any remaining basic and optional life insurance at individual rates. Coverage for spouse ends at member’s retirement and may be converted at individual rates.</td>
<td>• Must retire directly from active employment.</td>
</tr>
<tr>
<td><strong>Optional life insurance at retirement (MSEP 2000)</strong> - Under “Rule of 80”, an employee may retain the current amount of coverage prior to retirement until age 62 at which time coverage is reduced to $60,000, and may convert any remaining basic and optional life insurance at individual rates. Coverage for spouse ends at member’s retirement and may be converted at individual rates.</td>
<td>• Must retire directly from active employment.</td>
</tr>
<tr>
<td><strong>Optional life insurance at retirement (MSEP 2011)</strong> - Under “Rule of 90”, an employee may retain the current amount of coverage prior to retirement until age 62 at which time coverage is reduced to $60,000, and may convert any remaining basic and optional life insurance at individual rates. Coverage for spouse ends at member’s retirement and may be converted at individual rates.</td>
<td>• Must retire directly from active employment.</td>
</tr>
</tbody>
</table>

Note: Insured employees may port their life insurance and their dependent life insurance when their coverage has been reduced or terminated if they meet certain qualifications.
Long-Term Disability (LTD) Insurance Plans | June 30, 2017

MOSERS administers the LTD Plan for eligible state employees who become disabled during active employment.

Active Members

<table>
<thead>
<tr>
<th>Classification</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>General state employees, legislators, and elected state officials - Members of MOSERS in a position normally requiring 1,040 hours of work a year are covered under the LTD plan, unless they work for a state agency which has its own LTD plan.</td>
<td>Eligible participants receive 60% of their compensation minus primary social security, workers’ compensation, and employer provided income. Benefits commence after 90 days of disability or when sick leave benefits are no longer payable, whichever occurs last. LTD benefits cease upon the earliest of (i) when disability ends, (ii) when the member is first eligible for normal retirement benefits or is receiving early retirement benefits, (iii) upon a member’s death, (iv) the date benefits become payable under any other group long-term disability insurance plan, or, (v) the date the member fails to provide proof of continued disability and entitlement to LTD benefits.</td>
</tr>
<tr>
<td>Water patrol</td>
<td>Uniformed members who are eligible for statutory occupational disability receive benefits equal to 50% of compensation with no offset for social security at the time of disability. For nonoccupational disabilities, eligible participants receive the same benefit as general employees.</td>
</tr>
<tr>
<td>Judges</td>
<td>In addition to the disability benefits provided to general employees, judges may receive benefits under the state constitution. Participants may receive 50% of salary until the current term expires.</td>
</tr>
</tbody>
</table>
Changes in Plan Provisions

The 2017 legislative session came to an end on May 12. Senate Bill 62 was passed and then signed by the Governor. This bill fixes the College & University Retirement Plan (CURP) employer contribution rate at 6% of payroll and requires new employees to contribute 2% of payroll to the CURP. These provisions are effective July 1, 2018.

Two significant provisions affecting MOSERS were amended into SB 62 and were passed.

• Members of the MSEP 2011 will see a reduction in the vesting period from 10 years to 5 years. Offset provisions were included to ensure no increase in plan liability and affect MSEP 2011 members who terminate employment on or after January 1, 2018 with a vested retirement benefit. These members will: 1) receive their cost-of-living adjustment (COLA) in retirement at the 2nd anniversary of retirement (rather than the 1st anniversary), 2) not receive service credit for any unused sick leave accruals, and 3) provide a survivor benefit, if married, at the date of retirement eligibility, rather than the date of death.

• The MOSERS Board of Trustees was given the authority to establish a terminated-vested buyout program. This provision stipulates that any member who participates in the buyout program and returns to state employment will be considered a new employee with no prior service credit. The authority to establish a buyout program terminates on May 31, 2018. MOSERS’ actuarial professionals indicated a potential savings with this provision of approximately $7.1 million annually, with a 50% participation rate.

Senate Bill 34 was also passed and was signed by the Governor. Provisions within this bill modified the original pension forfeiture statutes passed by the General Assembly in 2014 that apply to all public pension plans in Missouri. SB 34 modifies “found guilty” within the statute to “convicted” and requires the “employer” to report the conviction to the associated retirement plan rather than “the court.” The original provisions passed in 2014 are related to a felony committed in direct connection with or directly related to an employee’s duties on or after August 28, 2014.
### Actuarial Present Values | June 30, 2017

#### MSEP

<table>
<thead>
<tr>
<th>Actuarial Present Value June 30, 2017</th>
<th>Actuarial Present Value</th>
<th>Portion Covered by Future Normal Cost Contributions</th>
<th>Actuarial Accrued Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Active members</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service retirement benefits based on services rendered before and likely to be rendered after valuation date</td>
<td>$5,333,879,237</td>
<td>$741,465,417</td>
<td>$4,592,413,820</td>
</tr>
<tr>
<td>Disability benefits likely to be paid to present active members who become totally and permanently disabled</td>
<td>155,214,308</td>
<td>98,421,685</td>
<td>56,792,623</td>
</tr>
<tr>
<td>Survivor benefits likely to be paid to widow(er)s and children of present active members who die before retiring</td>
<td>62,950,941</td>
<td>16,883,733</td>
<td>46,067,208</td>
</tr>
<tr>
<td>Separation benefits likely to be paid to present active members</td>
<td>222,057,440</td>
<td>141,299,477</td>
<td>80,757,963</td>
</tr>
<tr>
<td><strong>Active member totals</strong></td>
<td>$5,774,101,926</td>
<td>$998,070,312</td>
<td>4,776,031,614</td>
</tr>
<tr>
<td><strong>Members on leave of absence &amp; LTD</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service retirement benefits based on service rendered before the valuation date</td>
<td></td>
<td></td>
<td>107,083,816</td>
</tr>
<tr>
<td><strong>Terminated-vested members</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service retirement benefits based on service rendered before the valuation date</td>
<td></td>
<td></td>
<td>702,658,035</td>
</tr>
<tr>
<td><strong>Retired lives</strong></td>
<td></td>
<td></td>
<td>7,559,623,100</td>
</tr>
<tr>
<td><strong>Pending refunds</strong></td>
<td></td>
<td></td>
<td>6,877,330</td>
</tr>
<tr>
<td><strong>Total actuarial accrued liability</strong></td>
<td></td>
<td></td>
<td>13,152,273,895</td>
</tr>
<tr>
<td>Less: actuarial value of assets</td>
<td></td>
<td></td>
<td>8,872,381,848</td>
</tr>
<tr>
<td><strong>Unfunded actuarial accrued liability</strong></td>
<td></td>
<td></td>
<td>$4,279,892,047</td>
</tr>
<tr>
<td><strong>Funded ratio</strong></td>
<td></td>
<td></td>
<td>67.5%</td>
</tr>
</tbody>
</table>

#### Judicial Plan

<table>
<thead>
<tr>
<th>Actuarial Present Value June 30, 2017</th>
<th>Actuarial Present Value</th>
<th>Portion Covered by Future Normal Cost Contributions</th>
<th>Actuarial Accrued Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Active members</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service retirement benefits based on services rendered before and likely to be rendered after valuation date</td>
<td>$246,659,691</td>
<td>$72,113,464</td>
<td>$174,546,227</td>
</tr>
<tr>
<td>Disability benefits likely to be paid to present active members who become totally and permanently disabled</td>
<td>1,366,910</td>
<td>1,233,476</td>
<td>133,434</td>
</tr>
<tr>
<td>Survivor benefits likely to be paid to widow(er)s and children of present active members who die before retiring</td>
<td>5,102,166</td>
<td>3,146,899</td>
<td>1,955,267</td>
</tr>
<tr>
<td>Separation benefits likely to be paid to present active members</td>
<td>8,392,578</td>
<td>8,749,482</td>
<td>(356,904)</td>
</tr>
<tr>
<td><strong>Active member totals</strong></td>
<td>$261,521,345</td>
<td>$85,243,321</td>
<td>176,278,024</td>
</tr>
<tr>
<td><strong>Terminated-vested members</strong></td>
<td></td>
<td></td>
<td>11,040,367</td>
</tr>
<tr>
<td><strong>Retired lives</strong></td>
<td></td>
<td></td>
<td>377,099,534</td>
</tr>
<tr>
<td><strong>Total actuarial accrued liability</strong></td>
<td></td>
<td></td>
<td>564,417,925</td>
</tr>
<tr>
<td>Less: actuarial value of assets</td>
<td></td>
<td></td>
<td>151,828,631</td>
</tr>
<tr>
<td><strong>Unfunded actuarial accrued liability</strong></td>
<td></td>
<td></td>
<td>$412,589,294</td>
</tr>
<tr>
<td><strong>Funded ratio</strong></td>
<td></td>
<td></td>
<td>26.9%</td>
</tr>
</tbody>
</table>
Initially, 17,513 employees became members of MOSERS upon the system’s inception in 1957. By 2007, MOSERS was serving 100,470 members (54,763 actively employed; 29,129 retired/beneficiaries; 16,578 terminated-vested). Additionally, MOSERS benefit recipients were located in all 50 states and Puerto Rico as well as in at least 14 other countries.
Statistical Section

123  Summary
124  Changes in Net Position – Last Ten Fiscal Years
126  Deductions from Net Position for Benefits and Refunds by Type – Last Ten Fiscal Years
128  Valuation Assets (Smoothed Market) vs. Pension Liabilities
       Last Ten Fiscal Years – Pension Trust Funds
131  Contribution Rates as a Percent of Payroll – Last Ten Fiscal Years
132  Membership in Retirement Plans – Last Ten Fiscal Years
133  Distribution of Benefit Recipients by Location
134  Benefit Recipients by Type of Retirement and Option Selected
136  Benefits Payable Tabulated by Type of Benefit and by Option
137  Average Monthly Benefit Amounts – Ten Years Ended June 30, 2017
144  Retirees and Beneficiaries Tabulated by Fiscal Year of Retirement
146  Total Benefits Payable June 30, 2017 – Tabulated by Attained Ages of Benefit Recipients
Summary

Plan Membership
Membership in the pension trusts administered by MOSERS increased by 1,265. Active members decreased by 552, retired members and their beneficiaries increased by 1,751, and terminated-vested members increased by 66. Membership data for the last ten years ended June 30, 2017, can be found on page 132. The location of benefit recipients, showing that the majority remain in the state of Missouri after retirement, is depicted on page 133.

Valuation Assets vs Pension Liabilities
The charts on 128-130 graphically represent the funding progress of the pension plans for the 10 years ended June 30, 2017. The bar charts in the middle of the pages show the portion of the pension liabilities that are unfunded compared to the portion covered by assets in the trust funds. The bar charts on the bottom of the pages illustrate the funded ratio of the plans for the ten years ended June 30, 2017.

The existence of the unfunded actuarial accrued liabilities is not necessarily an indication of financial problems, but the fluctuations are important and must be monitored and controlled.

The remainder of this section contains various statistical and historical data considered useful in evaluating the condition of the plans.

All nonaccounting data is taken from MOSERS’ internal sources except for that information which is derived from the actuarial valuations (pages 128-132, 136, and 146-147). Member data may differ between some schedules since the valuations are performed using data as of May 31 each year.
## Changes in Net Position | Last Ten Fiscal Years

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MSEP</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Additions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employer contributions</td>
<td>$249,770,156</td>
<td>$252,105,008</td>
<td>$251,226,187</td>
<td>$263,418,048</td>
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<tr>
<td>Employee contributions</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>599,761</td>
</tr>
<tr>
<td>Member service purchases</td>
<td>3,085,133</td>
<td>3,235,999</td>
<td>3,576,954</td>
<td>2,814,551</td>
</tr>
<tr>
<td>Service transfer contributions</td>
<td>38,069</td>
<td>28,075</td>
<td>10,009</td>
<td>142,248</td>
</tr>
<tr>
<td>Investment income (net of expenses)</td>
<td>110,627,355</td>
<td>(1,508,376,715)</td>
<td>859,898,512</td>
<td>1,395,677,299</td>
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<tr>
<td>Other</td>
<td>572,274</td>
<td>619,060</td>
<td>639,901</td>
<td>659,474</td>
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<tr>
<td><strong>Total additions to plan net position</strong></td>
<td>364,092,987</td>
<td>(1,252,388,573)</td>
<td>1,115,351,563</td>
<td>1,663,311,381</td>
</tr>
<tr>
<td><strong>Deductions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benefits</td>
<td>479,853,891</td>
<td>511,466,555</td>
<td>543,284,289</td>
<td>597,424,954</td>
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<tr>
<td>Refunds</td>
<td>0</td>
<td>0</td>
<td>3,106</td>
<td>0</td>
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<tr>
<td>Service transfers out</td>
<td>251,443</td>
<td>0</td>
<td>462,970</td>
<td>17,745,828</td>
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<tr>
<td>Administrative expenses</td>
<td>6,950,878</td>
<td>7,088,483</td>
<td>7,064,544</td>
<td>7,054,581</td>
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<td><strong>Total deductions from plan net position</strong></td>
<td>487,056,212</td>
<td>518,555,038</td>
<td>550,814,909</td>
<td>622,225,363</td>
</tr>
<tr>
<td><strong>Change in net position</strong></td>
<td>$(122,963,225)</td>
<td>$(1,770,943,611)</td>
<td>$564,536,654</td>
<td>$1,041,086,018</td>
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<tr>
<td><strong>Judicial Plan</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Additions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employer contributions</td>
<td>$26,215,309</td>
<td>$27,725,882</td>
<td>$27,029,198</td>
<td>$27,702,682</td>
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<tr>
<td>Employee contributions</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>59,958</td>
</tr>
<tr>
<td>Investment income (net of expenses)</td>
<td>1,043,940</td>
<td>(15,847,382)</td>
<td>9,909,718</td>
<td>17,460,050</td>
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<tr>
<td>Other</td>
<td>5,506</td>
<td>6,504</td>
<td>7,374</td>
<td>8,250</td>
</tr>
<tr>
<td><strong>Total additions to plan net position</strong></td>
<td>27,264,755</td>
<td>11,885,004</td>
<td>36,946,290</td>
<td>45,230,940</td>
</tr>
<tr>
<td><strong>Deductions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benefits</td>
<td>22,058,085</td>
<td>23,232,088</td>
<td>24,230,545</td>
<td>25,488,531</td>
</tr>
<tr>
<td>Refunds</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Administrative expenses</td>
<td>66,880</td>
<td>74,473</td>
<td>81,414</td>
<td>88,253</td>
</tr>
<tr>
<td><strong>Total deductions from plan net position</strong></td>
<td>22,124,965</td>
<td>23,306,561</td>
<td>24,311,959</td>
<td>25,576,784</td>
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<tr>
<td><strong>Change in net position</strong></td>
<td>$5,139,790</td>
<td>$(11,421,557)</td>
<td>$12,634,331</td>
<td>$19,654,156</td>
</tr>
<tr>
<td><strong>Internal Service Fund</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Operating revenues</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Premium receipts</td>
<td>$27,957,666</td>
<td>$28,990,057</td>
<td>$29,098,799</td>
<td>$28,829,638</td>
</tr>
<tr>
<td>Deferred compensation receipts</td>
<td>60,393,973</td>
<td>75,661,047</td>
<td>69,143,267</td>
<td>54,221,226</td>
</tr>
<tr>
<td>Miscellaneous income</td>
<td>536,493</td>
<td>1,027,380</td>
<td>1,039,369</td>
<td>981,404</td>
</tr>
<tr>
<td><strong>Total operating revenues</strong></td>
<td>88,888,132</td>
<td>105,678,484</td>
<td>99,281,435</td>
<td>84,032,268</td>
</tr>
<tr>
<td><strong>Operating expenses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Premium disbursements</td>
<td>27,927,265</td>
<td>28,968,981</td>
<td>29,077,825</td>
<td>28,804,638</td>
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<tr>
<td>Deferred compensation disbursements</td>
<td>60,371,802</td>
<td>75,683,218</td>
<td>69,143,267</td>
<td>54,221,226</td>
</tr>
<tr>
<td>Premium refunds</td>
<td>30,401</td>
<td>21,076</td>
<td>20,974</td>
<td>24,999</td>
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<tr>
<td>Administrative expenses</td>
<td>708,100</td>
<td>819,581</td>
<td>797,020</td>
<td>826,809</td>
</tr>
<tr>
<td><strong>Total operating expenses</strong></td>
<td>89,037,568</td>
<td>105,492,856</td>
<td>99,039,086</td>
<td>83,877,672</td>
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<tr>
<td><strong>Nonoperating revenues</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Investment income</td>
<td>77,396</td>
<td>20,755</td>
<td>9,816</td>
<td>11,071</td>
</tr>
<tr>
<td><strong>Change in net position</strong></td>
<td>$(72,040)</td>
<td>$(266,383)</td>
<td>$252,165</td>
<td>$165,667</td>
</tr>
<tr>
<td></td>
<td>2012</td>
<td>2013</td>
<td>2014</td>
<td>2015</td>
</tr>
<tr>
<td>-------</td>
<td>--------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Sales</td>
<td>$263,373,924</td>
<td>$274,655,284</td>
<td>$326,370,336</td>
<td>$329,752,832</td>
</tr>
<tr>
<td>Cost</td>
<td>4,955,399</td>
<td>9,698,883</td>
<td>14,025,328</td>
<td>18,099,455</td>
</tr>
<tr>
<td>Income</td>
<td>2,869,085</td>
<td>3,475,123</td>
<td>2,909,423</td>
<td>1,859,005</td>
</tr>
<tr>
<td>Equipment</td>
<td>2,675,339</td>
<td>2,446,627</td>
<td>2,252,206</td>
<td>3,575,815</td>
</tr>
<tr>
<td>Net</td>
<td>158,102,123</td>
<td>778,008,348</td>
<td>1,484,709,539</td>
<td>(237,603,530)</td>
</tr>
<tr>
<td></td>
<td>448,463</td>
<td>489,193</td>
<td>450,453</td>
<td>533,001</td>
</tr>
<tr>
<td>Expenses</td>
<td>611,522,451</td>
<td>646,708,308</td>
<td>677,097,411</td>
<td>723,994,041</td>
</tr>
<tr>
<td>Cost</td>
<td>123,709</td>
<td>622,341</td>
<td>1,421,856</td>
<td>2,479,264</td>
</tr>
<tr>
<td>Income</td>
<td>588,180</td>
<td>1,911,665</td>
<td>1,916,840</td>
<td>1,792,495</td>
</tr>
<tr>
<td>Equipment</td>
<td>7,017,057</td>
<td>7,575,883</td>
<td>7,336,922</td>
<td>8,077,692</td>
</tr>
<tr>
<td>Net</td>
<td>619,251,397</td>
<td>656,818,197</td>
<td>687,773,029</td>
<td>736,343,492</td>
</tr>
<tr>
<td></td>
<td>$(186,827,064)</td>
<td>$(411,955,261)</td>
<td>$(1,142,944,256)</td>
<td>$(620,126,914)</td>
</tr>
</tbody>
</table>

Total: $2,061,916,000 | $2,268,657,000 | $2,392,503,000 | $2,499,400,000 | $2,549,400,000 | $2,571,000,000

Statistical Section

Missouri State Employees’ Retirement System / Fiscal Year 2017

125
# Deductions from Net Position for Benefits and Refunds by Type | Last Ten Fiscal Years

## MSEP

<table>
<thead>
<tr>
<th>Type of benefit</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retirement</td>
<td>$393,328,057</td>
<td>$421,847,017</td>
<td>$448,880,110</td>
<td>$476,841,741</td>
</tr>
<tr>
<td>Survivors</td>
<td>31,894,702</td>
<td>34,615,979</td>
<td>37,718,898</td>
<td>39,968,601</td>
</tr>
<tr>
<td>Disability</td>
<td>36,825</td>
<td>33,812</td>
<td>33,403</td>
<td>29,191</td>
</tr>
<tr>
<td>Lump sum</td>
<td>454,643</td>
<td>272,189</td>
<td>409,787</td>
<td>293,147</td>
</tr>
<tr>
<td>BackDROP and service transfers</td>
<td>54,139,664</td>
<td>54,697,557</td>
<td>56,705,060</td>
<td>98,038,103</td>
</tr>
<tr>
<td>Total benefits</td>
<td>$479,853,891</td>
<td>$511,466,554</td>
<td>$543,747,258</td>
<td>$615,170,783</td>
</tr>
<tr>
<td>Refunds</td>
<td>$0</td>
<td>$0</td>
<td>$3,106</td>
<td>$0</td>
</tr>
</tbody>
</table>

## Judicial Plan

<table>
<thead>
<tr>
<th>Type of benefit</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retirement</td>
<td>$18,342,676</td>
<td>$19,143,753</td>
<td>$19,784,720</td>
<td>$21,025,904</td>
</tr>
<tr>
<td>Survivors</td>
<td>3,715,409</td>
<td>4,088,335</td>
<td>4,445,825</td>
<td>4,462,627</td>
</tr>
<tr>
<td>Total benefits</td>
<td>$22,058,085</td>
<td>$23,232,088</td>
<td>$24,230,545</td>
<td>$25,488,531</td>
</tr>
<tr>
<td>Refunds</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
</tbody>
</table>

![MSEP graph](image-url)
### Missouri State Employees’ Retirement System / Fiscal Year 2017

#### Retirement System

<table>
<thead>
<tr>
<th>Year</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount</td>
<td>$504,555,055</td>
<td>$533,962,630</td>
<td>$560,553,490</td>
<td>$586,597,187</td>
<td>$615,708,229</td>
<td>$640,637,749</td>
</tr>
<tr>
<td>Members</td>
<td>42,963,959</td>
<td>46,659,381</td>
<td>49,922,170</td>
<td>52,940,062</td>
<td>56,495,787</td>
<td>59,628,687</td>
</tr>
<tr>
<td>Average Service</td>
<td>29,503</td>
<td>27,255</td>
<td>22,468</td>
<td>16,857</td>
<td>15,470</td>
<td>14,821</td>
</tr>
<tr>
<td>Average Service</td>
<td>229,650</td>
<td>191,320</td>
<td>286,184</td>
<td>57,525</td>
<td>267,198</td>
<td>123,005</td>
</tr>
<tr>
<td>Average Service</td>
<td>64,332,464</td>
<td>67,779,388</td>
<td>68,229,937</td>
<td>86,174,905</td>
<td>81,025,620</td>
<td>88,739,858</td>
</tr>
<tr>
<td>Total</td>
<td>$612,110,631</td>
<td>$648,619,974</td>
<td>$679,014,249</td>
<td>$725,786,536</td>
<td>$753,512,304</td>
<td>$789,144,120</td>
</tr>
</tbody>
</table>

#### Survivors

<table>
<thead>
<tr>
<th>Year</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount</td>
<td>$123,709</td>
<td>$622,341</td>
<td>$1,421,856</td>
<td>$2,479,264</td>
<td>$3,798,199</td>
<td>$4,820,737</td>
</tr>
<tr>
<td>Members</td>
<td>22,284,844</td>
<td>23,123,707</td>
<td>24,609,421</td>
<td>26,181,505</td>
<td>27,641,108</td>
<td>28,304,733</td>
</tr>
<tr>
<td>Average Service</td>
<td>4,536,569</td>
<td>4,679,169</td>
<td>4,797,204</td>
<td>5,064,400</td>
<td>5,338,598</td>
<td>5,675,104</td>
</tr>
<tr>
<td>Total</td>
<td>$26,821,413</td>
<td>$27,802,876</td>
<td>$29,406,625</td>
<td>$31,245,905</td>
<td>$32,979,706</td>
<td>$33,979,837</td>
</tr>
</tbody>
</table>

#### Judicial Plan

- **Retirement**
- **Survivors**

![Judicial Plan](chart)

- **2008**: $22,284,844
- **2009**: $23,123,707
- **2010**: $24,609,421
- **2011**: $26,181,505
- **2012**: $27,641,108
- **2013**: $28,304,733

Missouri State Employees’ Retirement System / Fiscal Year 2017
### Pension Trust Funds

#### Valuation Assets (Smoothed Market) vs. Pension Liabilities | Ten Years Ended June 30, 2017

### MSEP & Judicial Plans Combined

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Valuation Assets</th>
<th>Unfunded Liabilities</th>
<th>Accrued Liabilities</th>
<th>Funded Ratios</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>$7.9117</td>
<td>$1.5714</td>
<td>$ 9.4831</td>
<td>83.4%</td>
</tr>
<tr>
<td>2009</td>
<td>7.9574</td>
<td>1.9065</td>
<td>9.8639</td>
<td>80.7</td>
</tr>
<tr>
<td>2010</td>
<td>8.0123</td>
<td>2.2228</td>
<td>10.2350</td>
<td>78.3</td>
</tr>
<tr>
<td>2011</td>
<td>8.1210</td>
<td>2.3960</td>
<td>10.5170</td>
<td>77.2</td>
</tr>
<tr>
<td>2012</td>
<td>7.9994</td>
<td>3.2076</td>
<td>11.2070</td>
<td>71.4</td>
</tr>
<tr>
<td>2013</td>
<td>8.2075</td>
<td>3.3624</td>
<td>11.5700</td>
<td>70.9</td>
</tr>
<tr>
<td>2014</td>
<td>8.7621</td>
<td>3.1949</td>
<td>11.9569</td>
<td>73.3</td>
</tr>
<tr>
<td>2015</td>
<td>8.9268</td>
<td>3.2838</td>
<td>12.2106</td>
<td>73.1</td>
</tr>
<tr>
<td>2016</td>
<td>9.0216</td>
<td>4.2772</td>
<td>13.2988</td>
<td>67.8</td>
</tr>
<tr>
<td>2017</td>
<td>9.0242</td>
<td>4.6925</td>
<td>13.7167</td>
<td>65.8</td>
</tr>
</tbody>
</table>

### Actuarial Accrued Liabilities | All Plans Combined

- Valuation Assets
- Unfunded Liabilities

### Valuation Assets as Percent of Pension Liabilities | All Plans Combined

- Funded Ratio

---

Missouri State Employees’ Retirement System / Fiscal Year 2017

- [Back to Missouri State Employees’ Retirement System](#)
Pension Trust Funds
Valuation Assets (Smoothed Market) vs. Pension Liabilities | Ten Years Ended June 30, 2017

MSEP

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Valuation Assets</th>
<th>Unfunded Liabilities</th>
<th>Accrued Liabilities</th>
<th>Funded Ratios</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>$7.8385</td>
<td>$1.2898</td>
<td>$9.1283</td>
<td>85.9%</td>
</tr>
<tr>
<td>2009</td>
<td>7.8761</td>
<td>1.6187</td>
<td>9.4948</td>
<td>83.0</td>
</tr>
<tr>
<td>2010</td>
<td>7.9234</td>
<td>1.9300</td>
<td>9.8532</td>
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<tr>
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<td>8.0225</td>
<td>2.1010</td>
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<td>10.7937</td>
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<tr>
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<td>3.0382</td>
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<td>72.7</td>
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<td>8.6378</td>
<td>2.8568</td>
<td>11.4946</td>
<td>75.1</td>
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<tr>
<td>2015</td>
<td>8.7925</td>
<td>2.9351</td>
<td>11.7276</td>
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<tr>
<td>2016</td>
<td>8.8781</td>
<td>3.8731</td>
<td>12.7512</td>
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<tr>
<td>2017</td>
<td>8.8724</td>
<td>4.2799</td>
<td>13.1523</td>
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</table>

Actuarial Accrued Liabilities | MSEP

Valuation Assets as Percent of Pension Liabilities | MSEP
## Pension Trust Funds
### Valuation Assets (Smoothed Market) vs. Pension Liabilities | Ten Years Ended June 30, 2017

#### Judicial Plan

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Valuation Assets</th>
<th>Unfunded Liabilities</th>
<th>Accrued Liabilities</th>
<th>Funded Ratios</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>$0.0732</td>
<td>$0.2816</td>
<td>$0.3548</td>
<td>20.7%</td>
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<tr>
<td>2009</td>
<td>0.0813</td>
<td>0.2878</td>
<td>0.3691</td>
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<tr>
<td>2010</td>
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<td>0.2930</td>
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<td>0.2951</td>
<td>0.3935</td>
<td>25.0</td>
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<tr>
<td>2012</td>
<td>0.1023</td>
<td>0.3111</td>
<td>0.4133</td>
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<tr>
<td>2013</td>
<td>0.1111</td>
<td>0.3242</td>
<td>0.4354</td>
<td>25.5</td>
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<td>2014</td>
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<td>0.3381</td>
<td>0.4623</td>
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<td>0.4041</td>
<td>0.5476</td>
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<td>2017</td>
<td>0.1518</td>
<td>0.4126</td>
<td>0.5644</td>
<td>26.9</td>
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#### Actuarial Accrued Liabilities | Judicial Plan

#### Valuation Assets as Percent of Pension Liabilities | Judicial Plan
## Contribution Rates as a Percent of Payroll | Last Ten Fiscal Years

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>MSEP</th>
<th>Judicial Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>12.84%</td>
<td>58.65%</td>
</tr>
<tr>
<td>2009</td>
<td>12.53%</td>
<td>60.07%</td>
</tr>
<tr>
<td>2010</td>
<td>12.75%</td>
<td>58.48%</td>
</tr>
<tr>
<td>2011</td>
<td>13.81%</td>
<td>60.03%</td>
</tr>
<tr>
<td>2012</td>
<td>13.97%</td>
<td>57.30%</td>
</tr>
<tr>
<td>2013</td>
<td>14.45%</td>
<td>56.92%</td>
</tr>
<tr>
<td>2014</td>
<td>16.98%</td>
<td>59.69%</td>
</tr>
<tr>
<td>2015</td>
<td>16.97%</td>
<td>58.45%</td>
</tr>
<tr>
<td>2016</td>
<td>16.97%</td>
<td>58.45%</td>
</tr>
<tr>
<td>2017</td>
<td>16.97%</td>
<td>58.45%</td>
</tr>
</tbody>
</table>

### Contribution Rates

The table above shows the contribution rates as a percent of payroll for the Missouri State Employees’ Retirement System (MSEP) and the Judicial Plan for the last ten fiscal years. The rates for MSEP and Judicial Plan are shown in the chart below, which visually represents the data over the fiscal years from 2008 to 2017.
Membership in Retirement Plans | Last Ten Fiscal Years

MSEP & Judicial Plans Combined

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Active*</th>
<th>Retired/Beneficiaries</th>
<th>Terminated-Vested</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>54,943</td>
<td>30,572</td>
<td>17,123</td>
<td>102,638</td>
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<tr>
<td>2009</td>
<td>55,454</td>
<td>32,100</td>
<td>17,304</td>
<td>104,858</td>
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<tr>
<td>2010</td>
<td>53,880</td>
<td>33,716</td>
<td>17,441</td>
<td>105,037</td>
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<tr>
<td>2011</td>
<td>52,059</td>
<td>35,801</td>
<td>17,757</td>
<td>105,617</td>
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<tr>
<td>2012</td>
<td>51,730</td>
<td>37,796</td>
<td>18,075</td>
<td>107,601</td>
</tr>
<tr>
<td>2013</td>
<td>51,233</td>
<td>39,636</td>
<td>18,581</td>
<td>109,450</td>
</tr>
<tr>
<td>2014</td>
<td>51,026</td>
<td>41,511</td>
<td>18,957</td>
<td>111,494</td>
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<tr>
<td>2015</td>
<td>50,385</td>
<td>43,503</td>
<td>19,319</td>
<td>113,207</td>
</tr>
<tr>
<td>2016</td>
<td>49,872</td>
<td>45,368</td>
<td>19,538</td>
<td>114,778</td>
</tr>
<tr>
<td>2017</td>
<td>49,320</td>
<td>47,119</td>
<td>19,603</td>
<td>116,042</td>
</tr>
</tbody>
</table>

* Excludes members on leave of absence and long-term disability.

---

**Membership in Retirement Plans**

- Active
- Retired/Beneficiaries
- Terminated-Vested

**Active Members by Retirement Plan**

- MSEP
- MSEP 2000
- MSEP 2011
- Judicial Plan
### Distribution of Benefit Recipients by Location | June 30, 2017

**Benefit Recipients Outside the Continental United States**

<table>
<thead>
<tr>
<th>Country</th>
<th>Recipients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alaska</td>
<td>17</td>
</tr>
<tr>
<td>Hawaii</td>
<td>10</td>
</tr>
<tr>
<td>Army Post Office</td>
<td>1</td>
</tr>
<tr>
<td>Argentina</td>
<td>3</td>
</tr>
<tr>
<td>Brazil</td>
<td>14</td>
</tr>
<tr>
<td>Canada</td>
<td>1</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>3</td>
</tr>
<tr>
<td>Croatia</td>
<td>1</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>1</td>
</tr>
<tr>
<td>Ecuador</td>
<td>1</td>
</tr>
<tr>
<td>Germany</td>
<td>1</td>
</tr>
<tr>
<td>Guam</td>
<td>1</td>
</tr>
<tr>
<td>India</td>
<td>1</td>
</tr>
<tr>
<td>Ireland</td>
<td>2</td>
</tr>
<tr>
<td>Israel</td>
<td>2</td>
</tr>
<tr>
<td>Italy</td>
<td>2</td>
</tr>
<tr>
<td>Latvia</td>
<td>1</td>
</tr>
<tr>
<td>Mexico</td>
<td>1</td>
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<tr>
<td>Marshall Islands</td>
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<tr>
<td>P. R. China</td>
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<tr>
<td>Philippines</td>
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</tr>
<tr>
<td>Sri Lanka</td>
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</tr>
<tr>
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<td>Thailand</td>
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<td>United Arab Emirates</td>
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</tr>
<tr>
<td>United Kingdom</td>
<td>3</td>
</tr>
<tr>
<td>Virgin Islands</td>
<td>4</td>
</tr>
</tbody>
</table>
## Benefit Recipients by Type of Retirement and Option Selected | June 30, 2017

### MSEP

<table>
<thead>
<tr>
<th>Amount of Monthly Benefit</th>
<th>Number of Benefit Recipients</th>
<th>Type of Retirement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>1-250</td>
<td>5,572</td>
<td>2,051</td>
</tr>
<tr>
<td>251-500</td>
<td>7,977</td>
<td>3,852</td>
</tr>
<tr>
<td>501-750</td>
<td>5,597</td>
<td>3,276</td>
</tr>
<tr>
<td>751-1000</td>
<td>5,033</td>
<td>3,752</td>
</tr>
<tr>
<td>1001-1250</td>
<td>4,514</td>
<td>3,789</td>
</tr>
<tr>
<td>1251-1500</td>
<td>3,779</td>
<td>3,315</td>
</tr>
<tr>
<td>1501-1750</td>
<td>3,064</td>
<td>2,766</td>
</tr>
<tr>
<td>1751-2000</td>
<td>2,465</td>
<td>2,271</td>
</tr>
<tr>
<td>Over 2000</td>
<td>9,058</td>
<td>8,413</td>
</tr>
<tr>
<td>Total</td>
<td>47,059</td>
<td>33,485</td>
</tr>
</tbody>
</table>

### Judicial Plan

<table>
<thead>
<tr>
<th>Amount of Monthly Benefit</th>
<th>Number of Benefit Recipients</th>
<th>Type of Retirement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>1-250</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>251-500</td>
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<td>501-750</td>
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<td>751-1000</td>
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<td>1001-1250</td>
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<td>1501-1750</td>
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<tr>
<td>1751-2000</td>
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<td>0</td>
</tr>
<tr>
<td>Over 2000</td>
<td>519</td>
<td>315</td>
</tr>
<tr>
<td>Total</td>
<td>569</td>
<td>317</td>
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</tbody>
</table>

### Type of Retirement
- A - Normal retirement
- B - Early retirement
- C - Survivor of active
- D - Survivor of retired
- E - Disability
- F - Occupational disability (Water Patrol)
- G - Ex-spouse
### Option Selected

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
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<td>260</td>
<td>224</td>
<td>323</td>
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<td>440</td>
<td>43</td>
<td>3,080</td>
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<td>8</td>
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<td>817</td>
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<td>4,385</td>
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<td>88</td>
<td>320</td>
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<td>2,817</td>
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<td>7</td>
<td>26</td>
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<td>55</td>
<td>355</td>
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<td>1,016</td>
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<td>2,303</td>
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<td>863</td>
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<td>753</td>
<td>4,428</td>
<td>6</td>
<td>10,811</td>
<td>6,534</td>
<td>88</td>
<td>23,110</td>
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### Option Selected

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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
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<tbody>
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</tr>
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<tr>
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<td>3</td>
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<tr>
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<td>22</td>
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<td>0</td>
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<td>11</td>
</tr>
<tr>
<td>521</td>
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<td>0</td>
<td>0</td>
<td>24</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>22</td>
</tr>
</tbody>
</table>

**Option Selected**

1 - Automatic 50% joint & survivor
2 - 60 guaranteed payments
3 - 120 guaranteed payments
4 - 180 guaranteed payments
5 - 50% joint & survivor
6 - 75% joint & survivor
7 - 100% joint & survivor
8 - Unreduced 50% joint & survivor
9 - Automatic minor survivor
10 - No survivor option (includes pop-ups)
Benefits Payable Tabulated by Type of Benefit and by Option | June 30, 2017

### MSEP (Closed Plan)

<table>
<thead>
<tr>
<th>Type of Benefit</th>
<th>Number</th>
<th>Annual Benefits</th>
<th>Average Annual Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Service retirement</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life annuity</td>
<td>5,805</td>
<td>$83,298,036</td>
<td>$14,349</td>
</tr>
<tr>
<td>Joint and 50% survivor (unreduced)</td>
<td>5,204</td>
<td>97,108,116</td>
<td>18,660</td>
</tr>
<tr>
<td>Joint and 100% survivor</td>
<td>3,016</td>
<td>64,744,092</td>
<td>21,467</td>
</tr>
<tr>
<td>Life income with 60 guaranteed payments</td>
<td>139</td>
<td>1,594,128</td>
<td>11,469</td>
</tr>
<tr>
<td>Life income with 120 guaranteed payments</td>
<td>173</td>
<td>2,064,924</td>
<td>11,936</td>
</tr>
<tr>
<td>Survivor beneficiary</td>
<td>2,577</td>
<td>33,608,208</td>
<td>13,042</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16,914</td>
<td>282,417,504</td>
<td>16,697</td>
</tr>
<tr>
<td><strong>Disability retirement</strong></td>
<td>3</td>
<td>11,496</td>
<td>3,832</td>
</tr>
<tr>
<td><strong>Death-in-service</strong></td>
<td>1,465</td>
<td>17,185,068</td>
<td>11,730</td>
</tr>
<tr>
<td><strong>Grand totals</strong></td>
<td>18,382</td>
<td>$299,614,068</td>
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</table>

### MSEP 2000

<table>
<thead>
<tr>
<th>Type of Benefit</th>
<th>Number</th>
<th>Annual Benefits</th>
<th>Average Annual Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Service retirement</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life annuity</td>
<td>16,847</td>
<td>$234,665,676</td>
<td>$13,929</td>
</tr>
<tr>
<td>Joint and 50% survivor</td>
<td>4,039</td>
<td>78,872,196</td>
<td>19,528</td>
</tr>
<tr>
<td>Joint and 100% survivor</td>
<td>4,725</td>
<td>73,981,704</td>
<td>15,658</td>
</tr>
<tr>
<td>Life income with 60 guaranteed payments</td>
<td>23</td>
<td>340,632</td>
<td>14,810</td>
</tr>
<tr>
<td>Life income with 120 guaranteed payments</td>
<td>766</td>
<td>7,617,840</td>
<td>9,945</td>
</tr>
<tr>
<td>Life income with 180 guaranteed payments</td>
<td>623</td>
<td>5,139,768</td>
<td>8,250</td>
</tr>
<tr>
<td>Survivor beneficiary</td>
<td>932</td>
<td>8,945,796</td>
<td>9,598</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>27,955</td>
<td>409,563,612</td>
<td>14,651</td>
</tr>
<tr>
<td><strong>Death-in-service</strong></td>
<td>220</td>
<td>984,780</td>
<td>4,476</td>
</tr>
<tr>
<td><strong>Grand totals</strong></td>
<td>28,175</td>
<td>$410,548,392</td>
<td>14,571</td>
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</table>

### Judicial Plan

<table>
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<tr>
<th>Type of Benefit</th>
<th>Number</th>
<th>Annual Benefits</th>
<th>Average Annual Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Service retirement</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life annuity</td>
<td>5</td>
<td>$326,856</td>
<td>$65,371</td>
</tr>
<tr>
<td>Joint and 50% survivor</td>
<td>392</td>
<td>28,393,644</td>
<td>72,433</td>
</tr>
<tr>
<td>Joint and 100% survivor</td>
<td>1</td>
<td>10,668</td>
<td>10,668</td>
</tr>
<tr>
<td>Survivor beneficiary</td>
<td>126</td>
<td>4,727,364</td>
<td>37,519</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>524</td>
<td>33,458,532</td>
<td>63,852</td>
</tr>
<tr>
<td><strong>Death-in-service</strong></td>
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<td>1,168,896</td>
<td>33,397</td>
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<td><strong>Grand totals</strong></td>
<td>559</td>
<td>$34,627,428</td>
<td>61,945</td>
</tr>
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</table>
## Average Monthly Benefit Amounts | Ten Years Ended June 30, 2017

### MSEP

<table>
<thead>
<tr>
<th>Years Credited Service by Category</th>
<th>&lt;5</th>
<th>5-10</th>
<th>10-15</th>
<th>15-20</th>
<th>20-25</th>
<th>25-30</th>
<th>30+</th>
<th>All Members</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Members Retiring During Fiscal Year</strong></td>
<td>2008</td>
<td>2009</td>
<td>2010</td>
<td>2011</td>
<td>2012</td>
<td>2013</td>
<td>2014</td>
<td>2015</td>
</tr>
<tr>
<td><strong>Average monthly benefit</strong></td>
<td>$0</td>
<td>$111</td>
<td>$442</td>
<td>$367</td>
<td>$126</td>
<td>$251</td>
<td>$280</td>
<td>$219</td>
</tr>
<tr>
<td><strong>Average final average salary</strong></td>
<td>$0</td>
<td>$267</td>
<td>$2,373</td>
<td>$1,596</td>
<td>$7,854</td>
<td>$3,744</td>
<td>$4,426</td>
<td>$5,058</td>
</tr>
<tr>
<td><strong>Number of retirees</strong></td>
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<td>425</td>
<td>461</td>
<td>2,127</td>
<td>461</td>
<td>500</td>
<td>601</td>
<td>498</td>
</tr>
</tbody>
</table>

Note: COLA increases and temporary benefits payable under MSEP 2000 until age 62 are excluded from the above for comparison purposes.
## Average Monthly Benefit Amounts | Ten Years Ended June 30, 2017

### General Employees in the MSEP*

<table>
<thead>
<tr>
<th>Years Credited Service by Category</th>
<th>&lt;5</th>
<th>5-10</th>
<th>10-15</th>
<th>15-20</th>
<th>20-25</th>
<th>25-30</th>
<th>30+</th>
<th>All Members</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Members Retiring During Fiscal Year</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>2008</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Average monthly benefit</td>
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<td>$ 451</td>
<td>$ 713</td>
<td>$ 1,090</td>
<td>$ 1,586</td>
<td>$ 2,025</td>
<td>$ 917</td>
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<td>$ 2,904</td>
<td>$ 3,363</td>
<td>$ 3,658</td>
<td>$ 2,833</td>
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<td>408</td>
<td>342</td>
<td>369</td>
<td>382</td>
<td>195</td>
<td>2,117</td>
</tr>
<tr>
<td>2009</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Average monthly benefit</td>
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<td>$ 267</td>
<td>$ 470</td>
<td>$ 740</td>
<td>$ 1,209</td>
<td>$ 1,635</td>
<td>$ 2,175</td>
<td>$ 965</td>
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<tr>
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<td>$ 2,440</td>
<td>$ 2,854</td>
<td>$ 3,187</td>
<td>$ 3,460</td>
<td>$ 3,971</td>
<td>$ 2,952</td>
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<tr>
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<td>320</td>
<td>413</td>
<td>387</td>
<td>179</td>
<td>2,134</td>
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<tr>
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<td>$ 2,519</td>
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<td>$ 3,456</td>
<td>$ 3,815</td>
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<td>446</td>
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<td>393</td>
<td>337</td>
<td>220</td>
<td>2,243</td>
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<tr>
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<td>$ 302</td>
<td>$ 472</td>
<td>$ 802</td>
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<td>$ 1,622</td>
<td>$ 2,124</td>
<td>$ 992</td>
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<td>$ 3,055</td>
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<td>440</td>
<td>494</td>
<td>492</td>
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<td>2,269</td>
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<tr>
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<td>$ 805</td>
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<td>$ 1,617</td>
<td>$ 2,271</td>
<td>$ 932</td>
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<td>$ 2,626</td>
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<td>$ 3,295</td>
<td>$ 3,475</td>
<td>$ 4,109</td>
<td>$ 3,045</td>
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<td>Number of retirees</td>
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<td>584</td>
<td>532</td>
<td>404</td>
<td>473</td>
<td>372</td>
<td>196</td>
<td>2,566</td>
</tr>
<tr>
<td>2013</td>
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<tr>
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<td>$ 1,995</td>
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<td>388</td>
<td>203</td>
<td>2,540</td>
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<td></td>
</tr>
<tr>
<td>Average monthly benefit</td>
<td>$ 262</td>
<td>$ 298</td>
<td>$ 514</td>
<td>$ 803</td>
<td>$ 1,195</td>
<td>$ 1,691</td>
<td>$ 2,207</td>
<td>$ 935</td>
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<td>$ 2,612</td>
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<td>$ 3,230</td>
<td>$ 3,650</td>
<td>$ 3,999</td>
<td>$ 3,065</td>
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<tr>
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<td>629</td>
<td>503</td>
<td>368</td>
<td>435</td>
<td>392</td>
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<td>2015</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Average monthly benefit</td>
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<td>$ 301</td>
<td>$ 517</td>
<td>$ 786</td>
<td>$ 1,268</td>
<td>$ 1,723</td>
<td>$ 2,208</td>
<td>$ 994</td>
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<tr>
<td>Average final average salary</td>
<td>$ 5,058</td>
<td>$ 2,581</td>
<td>$ 2,623</td>
<td>$ 2,947</td>
<td>$ 3,416</td>
<td>$ 3,729</td>
<td>$ 4,007</td>
<td>$ 3,116</td>
</tr>
<tr>
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<td>633</td>
<td>517</td>
<td>433</td>
<td>450</td>
<td>487</td>
<td>249</td>
<td>2,775</td>
</tr>
<tr>
<td>2016</td>
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<td></td>
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<tr>
<td>Average monthly benefit</td>
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<td>$ 297</td>
<td>$ 506</td>
<td>$ 819</td>
<td>$ 1,285</td>
<td>$ 1,838</td>
<td>$ 2,343</td>
<td>$ 1,011</td>
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<tr>
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<td>$ 2,617</td>
<td>$ 2,600</td>
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<td>$ 3,420</td>
<td>$ 3,968</td>
<td>$ 4,184</td>
<td>$ 3,168</td>
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<td>603</td>
<td>502</td>
<td>430</td>
<td>502</td>
<td>423</td>
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<td>2017</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Average monthly benefit</td>
<td>$ 230</td>
<td>$ 313</td>
<td>$ 551</td>
<td>$ 934</td>
<td>$ 1,355</td>
<td>$ 1,853</td>
<td>$ 2,379</td>
<td>$ 1,109</td>
</tr>
<tr>
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<td>$ 5,026</td>
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<td>$ 2,839</td>
<td>$ 3,414</td>
<td>$ 3,624</td>
<td>$ 4,016</td>
<td>$ 4,265</td>
<td>$ 3,395</td>
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<tr>
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<td>500</td>
<td>504</td>
<td>456</td>
<td>439</td>
<td>476</td>
<td>238</td>
<td>2,619</td>
</tr>
</tbody>
</table>

**Ten Years Ended June 30, 2017**

| | | | | | | | |
| Average monthly benefit | $ 171 | $ 293 | $ 498 | $ 797 | $ 1,230 | $ 1,692 | $ 2,186 | $ 973 |
| Average final average salary | $ 4,617 | $ 2,578 | $ 2,581 | $ 2,996 | $ 3,286 | $ 3,641 | $ 3,955 | $ 3,068 |
| Number of retirees | 34 | 5,458 | 4,841 | 3,927 | 4,405 | 4,136 | 2,170 | 24,971 |

*Excludes legislators, elected officials, water patrol, and administrative law judges.

Note: COLA increases and temporary benefits payable under MSEP 2000 until age 62 are excluded from the above for comparison purposes.
### Average Monthly Benefit Amounts | Ten Years Ended June 30, 2017

**Legislators in the MSEP**

<table>
<thead>
<tr>
<th>Members Retiring During Fiscal Year</th>
<th>&lt;5</th>
<th>5-10</th>
<th>10-15</th>
<th>15-20</th>
<th>20-25</th>
<th>25-30</th>
<th>30+</th>
<th>All Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average monthly benefit</td>
<td>$0</td>
<td>$816</td>
<td>$1,156</td>
<td>$1,742</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$1,045</td>
</tr>
<tr>
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<td>$2,613</td>
<td>$2,613</td>
<td>$2,613</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$2,613</td>
</tr>
<tr>
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<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>2009</td>
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<td></td>
<td></td>
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<td></td>
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<tr>
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<td>$2,993</td>
<td>$2,993</td>
<td>$2,993</td>
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<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>19</td>
</tr>
<tr>
<td>2010</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
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<td>$0</td>
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<tr>
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<td>$2,993</td>
<td>$2,993</td>
<td>$2,993</td>
<td>$2,993</td>
<td>$0</td>
<td>$0</td>
<td>$2,993</td>
</tr>
<tr>
<td>Number of retirees</td>
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<td>1</td>
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<tr>
<td>2011</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average monthly benefit</td>
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<td>$1,512</td>
<td>$2,021</td>
<td>$2,744</td>
<td>$3,242</td>
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<td>$1,247</td>
</tr>
<tr>
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<td>$2,993</td>
<td>$2,993</td>
<td>$2,993</td>
<td>$2,993</td>
<td>$0</td>
<td>$2,993</td>
</tr>
<tr>
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<td>1</td>
<td>1</td>
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</tr>
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<tr>
<td>Average monthly benefit</td>
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<td>$1,659</td>
<td>$2,225</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
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<td>$2,993</td>
<td>$2,993</td>
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</tr>
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</tr>
<tr>
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<td>$1,513</td>
<td>$2,120</td>
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<td>$0</td>
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<td>$1,036</td>
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<td>$2,993</td>
<td>$2,993</td>
<td>$2,993</td>
<td>$2,993</td>
<td>$2,993</td>
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<td>$1,995</td>
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<td>$0</td>
<td>$1,296</td>
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<td>$2,993</td>
<td>$2,993</td>
<td>$2,993</td>
<td>$2,993</td>
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</tr>
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<td>2015</td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Average monthly benefit</td>
<td>$0</td>
<td>$977</td>
<td>$1,735</td>
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<td>$1,315</td>
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<td>$0</td>
<td>$2,993</td>
<td>$2,993</td>
<td>$2,993</td>
<td>$2,993</td>
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<td>0</td>
<td>0</td>
<td>15</td>
</tr>
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<td>2016</td>
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<td></td>
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<td></td>
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<tr>
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<td>$0</td>
<td>$1,048</td>
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<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
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<tr>
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<td>$2,993</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
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<td>$2,993</td>
</tr>
<tr>
<td>Number of retirees</td>
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<td>7</td>
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<td>0</td>
<td>0</td>
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<td>7</td>
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<td>2017</td>
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<td></td>
</tr>
<tr>
<td>Average monthly benefit</td>
<td>$499</td>
<td>$954</td>
<td>$1,580</td>
<td>$1,995</td>
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<td>$0</td>
<td>$0</td>
<td>$1,041</td>
</tr>
<tr>
<td>Average final average salary</td>
<td>$2,993</td>
<td>$2,993</td>
<td>$2,993</td>
<td>$2,993</td>
<td>$2,993</td>
<td>$2,993</td>
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<td>$2,993</td>
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<tr>
<td>Number of retirees</td>
<td>2</td>
<td>17</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>23</td>
</tr>
</tbody>
</table>

Ten Years Ended June 30, 2017

| Average monthly benefit | $393 | $964 | $1,522| $2,066| $2,628| $3,242| $0  | $1,186      |
| Average final average salary | $2,993| $2,981| $2,964| $2,971| $2,993| $2,993| $0  | $2,978      |
| Number of retirees         | 6    | 123  | 26    | 17    | 3     | 2     | 0   | 177         |

Note: COLA increases and temporary benefits payable under MSEP 2000 until age 62 are excluded from the above for comparison purposes.
## Statistical Section

### Average Monthly Benefit Amounts | Ten Years Ended June 30, 2017

#### Elected Officials in the MSEP

<table>
<thead>
<tr>
<th>Members Retiring During Fiscal Year</th>
<th>Average monthly benefit</th>
<th>Average final average salary</th>
<th>Number of retirees</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>$0 $0 $0 $0 $0 $0 $0 $0</td>
<td>$0 $0 $0 $0 $0 $0 $0 $0</td>
<td>0</td>
</tr>
<tr>
<td>2009</td>
<td>$0 $3,336 $4,852 $0 $0 $0 $0 $4,094</td>
<td>$0 $8,979 $9,703 $0 $0 $0 $0 $9,341</td>
<td>2</td>
</tr>
<tr>
<td>2010</td>
<td>$0 $0 $0 $0 $0 $0 $0 $0</td>
<td>$0 $0 $0 $0 $0 $0 $0 $0</td>
<td>0</td>
</tr>
<tr>
<td>2011</td>
<td>$0 $0 $0 $0 $0 $0 $0 $0</td>
<td>$0 $0 $0 $0 $0 $0 $0 $0</td>
<td>0</td>
</tr>
<tr>
<td>2012</td>
<td>$0 $0 $0 $3,781 $0 $0 $0 $3,781</td>
<td>$0 $0 $0 $8,093 $0 $0 $0 $8,093</td>
<td>2</td>
</tr>
<tr>
<td>2013</td>
<td>$0 $0 $0 $4,489 $0 $0 $0 $4,489</td>
<td>$0 $0 $0 $8,979 $0 $0 $0 $8,979</td>
<td>0</td>
</tr>
<tr>
<td>2014</td>
<td>$0 $0 $0 $0 $0 $0 $0 $0</td>
<td>$0 $0 $0 $0 $0 $0 $0 $0</td>
<td>0</td>
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<tr>
<td>2015</td>
<td>$0 $0 $0 $0 $0 $0 $0 $0</td>
<td>$0 $0 $0 $0 $0 $0 $0 $0</td>
<td>0</td>
</tr>
<tr>
<td>2016</td>
<td>$0 $0 $0 $2,993 $0 $0 $0 $3,889</td>
<td>$0 $0 $0 $8,979 $0 $0 $0 $9,113</td>
<td>3</td>
</tr>
<tr>
<td>2017</td>
<td>$0 $3,165 $4,000 $0 $0 $0 $0 $0</td>
<td>$0 $8,979 $8,415 $0 $0 $0 $0 $8,898</td>
<td>8</td>
</tr>
</tbody>
</table>

Ten Years Ended June 30, 2017

<table>
<thead>
<tr>
<th>Year</th>
<th>Average monthly benefit</th>
<th>Average final average salary</th>
<th>Number of retirees</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>$0 $0 $0 $0 $0 $0 $0 $0</td>
<td>$0 $0 $0 $0 $0 $0 $0 $0</td>
<td>0</td>
</tr>
<tr>
<td>2009</td>
<td>$0 $3,336 $4,852 $0 $0 $0 $0 $4,094</td>
<td>$0 $8,979 $9,703 $0 $0 $0 $0 $9,341</td>
<td>2</td>
</tr>
<tr>
<td>2010</td>
<td>$0 $0 $0 $0 $0 $0 $0 $0</td>
<td>$0 $0 $0 $0 $0 $0 $0 $0</td>
<td>0</td>
</tr>
<tr>
<td>2011</td>
<td>$0 $0 $0 $0 $0 $0 $0 $0</td>
<td>$0 $0 $0 $0 $0 $0 $0 $0</td>
<td>0</td>
</tr>
<tr>
<td>2012</td>
<td>$0 $0 $0 $3,781 $0 $0 $0 $3,781</td>
<td>$0 $0 $0 $8,093 $0 $0 $0 $8,093</td>
<td>2</td>
</tr>
<tr>
<td>2013</td>
<td>$0 $0 $0 $4,489 $0 $0 $0 $4,489</td>
<td>$0 $0 $0 $8,979 $0 $0 $0 $8,979</td>
<td>0</td>
</tr>
<tr>
<td>2014</td>
<td>$0 $0 $0 $0 $0 $0 $0 $0</td>
<td>$0 $0 $0 $0 $0 $0 $0 $0</td>
<td>0</td>
</tr>
<tr>
<td>2015</td>
<td>$0 $0 $0 $0 $0 $0 $0 $0</td>
<td>$0 $0 $0 $0 $0 $0 $0 $0</td>
<td>0</td>
</tr>
<tr>
<td>2016</td>
<td>$0 $0 $0 $2,993 $0 $0 $0 $3,889</td>
<td>$0 $0 $0 $8,979 $0 $0 $0 $9,113</td>
<td>3</td>
</tr>
</tbody>
</table>

Note: COLA increases are excluded from the above for comparison purposes.
### Uniformed Water Patrol in the MSEP

#### Years Credited Service by Category

<table>
<thead>
<tr>
<th>Members Retiring During Fiscal Year</th>
<th>&lt;5</th>
<th>5-10</th>
<th>10-15</th>
<th>15-20</th>
<th>20-25</th>
<th>25-30</th>
<th>30+</th>
<th>All Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average monthly benefit</td>
<td>$0</td>
<td>$0</td>
<td>$750</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
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<td>$750</td>
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<tr>
<td>Average final average salary</td>
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<td>$0</td>
<td>$2,541</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$2,541</td>
</tr>
<tr>
<td>Number of retirees</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

#### Ten Years Ended June 30, 2017

| Average monthly benefit            | $0 | $69  | $750  | $1,019 | $0    | $2,841 | $4,622 | $2,933      |
| Average final average salary       | $0 | $1,291 | $2,507 | $0    | $0    | $0    | $0  | $2,507      |
| Number of retirees                 | 1  | 1    | 1     | 1     | 1     | 1     | 1   | 1           |

#### Ten Years Ended June 30, 2017

Note: COLA increases and temporary benefits payable under MSEP 2000 until age 62 are excluded from the above for comparison purposes.
### Average Monthly Benefit Amounts | Ten Years Ended June 30, 2017

#### Administrative Law Judges and Legal Advisors in the MSEP

<table>
<thead>
<tr>
<th>Years Credited Service by Category</th>
<th>&lt;5</th>
<th>5-10</th>
<th>10-15</th>
<th>15-20</th>
<th>20-25</th>
<th>25-30</th>
<th>30+</th>
<th>All Members</th>
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<tbody>
<tr>
<td>Average monthly benefit 2008</td>
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<td>$0</td>
<td>$1,679</td>
<td>$3,968</td>
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<td>1</td>
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<td>2</td>
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<tr>
<td>Average monthly benefit 2009</td>
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<td>$0</td>
<td>$4,200</td>
<td>$0</td>
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<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
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<tr>
<td>Average monthly benefit 2010</td>
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<td>$0</td>
<td>$2,827</td>
<td>$4,101</td>
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<td>$0</td>
<td>$0</td>
<td>$2,645</td>
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<tr>
<td>Average final average salary 2010</td>
<td>$8,172</td>
<td>$0</td>
<td>$5,851</td>
<td>$8,202</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$7,019</td>
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<td>2</td>
<td>1</td>
<td>0</td>
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<tr>
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<td>$3,216</td>
<td>$4,101</td>
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<td>$0</td>
<td>$3,511</td>
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<td>Average final average salary 2011</td>
<td>$8,172</td>
<td>$0</td>
<td>$6,433</td>
<td>$8,202</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$7,023</td>
</tr>
<tr>
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<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Average monthly benefit 2012</td>
<td>$0</td>
<td>$2,493</td>
<td>$0</td>
<td>$4,204</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$3,692</td>
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<td>Average final average salary 2012</td>
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<td>$8,756</td>
<td>$8,408</td>
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<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Average monthly benefit 2013</td>
<td>$0</td>
<td>$2,259</td>
<td>$0</td>
<td>$4,134</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$3,747</td>
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<td>$0</td>
<td>$0</td>
<td>$7,494</td>
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<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Average monthly benefit 2014</td>
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<td>$0</td>
<td>$4,204</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$2,433</td>
</tr>
<tr>
<td>Average final average salary 2014</td>
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<td>$8,146</td>
<td>$8,146</td>
<td>$0</td>
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<td>$8,146</td>
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<tr>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Average monthly benefit 2015</td>
<td>$0</td>
<td>$2,259</td>
<td>$0</td>
<td>$4,134</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$2,636</td>
</tr>
<tr>
<td>Average final average salary 2015</td>
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<td>$6,023</td>
<td>$6,980</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$6,980</td>
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<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
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<tr>
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<td>$853</td>
<td>$0</td>
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<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$3,072</td>
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<tr>
<td>Average final average salary 2016</td>
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<td>$7,623</td>
<td>$6,594</td>
<td>$0</td>
<td>$0</td>
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<td>$6,594</td>
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<tr>
<td>Number of retirees 2016</td>
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<td>1</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Average monthly benefit 2017</td>
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<td>$5,298</td>
<td>$5,273</td>
<td>$4,009</td>
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<td></td>
</tr>
<tr>
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<td>$10,546</td>
<td>$9,262</td>
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<td></td>
</tr>
<tr>
<td>Number of retirees 2017</td>
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<td>0</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ten Years Ended June 30, 2017

| Average monthly benefit 2008     | $612| $2,010| $2,737| $4,105| $4,010| $4,751| $4,862| $3,340     |
| Average final average salary 2008| $6,975| $7,087| $5,540| $8,209| $8,020| $9,502| $9,723| $7,542     |
| Number of retirees 2017          | 2   | 4    | 6     | 5     | 7     | 2     | 2    | 28         |

Note: COLA increases are excluded from the above for comparison purposes.
### Average Monthly Benefit Amounts | Ten Years Ended June 30, 2017

**Judicial Plan**

<table>
<thead>
<tr>
<th>Years Credited Service by Category</th>
<th>&lt;5</th>
<th>5-10</th>
<th>10-15</th>
<th>15-20</th>
<th>20-25</th>
<th>25-30</th>
<th>30+</th>
<th>All Members</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Members Retiring During Fiscal Year</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2008</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average monthly benefit</td>
<td>$592</td>
<td>$2,045</td>
<td>$4,120</td>
<td>$4,828</td>
<td>$5,132</td>
<td>$4,593</td>
<td>$5,186</td>
<td>$3,908</td>
</tr>
<tr>
<td>Average final average salary</td>
<td>$5,821</td>
<td>$6,203</td>
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**Ten Years Ended June 30, 2017**

| Average monthly benefit | $681 | $2,663 | $4,591 | $4,982 | $5,544 | $5,381 | $5,321 | $4,549 |
| Average final average salary | $6,970 | $8,654 | $9,426 | $9,958 | $11,088 | $10,762 | $10,641 | $9,855 |
| Number of retirees | 12 | 28 | 52 | 52 | 36 | 26 | 22 | 228 |

*Note: COLA increases are excluded from the above for comparison purposes.*
### Retirees and Beneficiaries
Tabulated by Fiscal Year of Retirement | As of June 30, 2017

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| Total                      | 47,059 | $712,621,799         | $1,262                |
Retirees and Beneficiaries
Tabulated by Fiscal Year of Retirement | As of June 30, 2017

Judicial Plan

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<td>2012</td>
<td>20</td>
<td>974,227</td>
<td>4,059</td>
</tr>
<tr>
<td>2013</td>
<td>31</td>
<td>2,016,888</td>
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<tr>
<td>2014</td>
<td>24</td>
<td>1,393,601</td>
<td>4,839</td>
</tr>
<tr>
<td>2015</td>
<td>55</td>
<td>3,722,820</td>
<td>5,641</td>
</tr>
<tr>
<td>2016</td>
<td>27</td>
<td>1,647,204</td>
<td>5,084</td>
</tr>
<tr>
<td>2017</td>
<td>36</td>
<td>2,181,780</td>
<td>5,050</td>
</tr>
<tr>
<td></td>
<td>569</td>
<td>$34,651,433</td>
<td>$5,075</td>
</tr>
</tbody>
</table>
### Total Benefits Payable
**Tabulated by Attained Ages of Benefit Recipients**  |  As of June 30, 2017

<table>
<thead>
<tr>
<th>Attained Ages</th>
<th>Service Retirement</th>
<th>Survivors and Beneficiaries</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>Annual Benefits</td>
<td>No.</td>
</tr>
<tr>
<td>54 and Under</td>
<td>515</td>
<td>$16,536,108</td>
<td>562</td>
</tr>
<tr>
<td>55-59</td>
<td>3,396</td>
<td>73,612,968</td>
<td>350</td>
</tr>
<tr>
<td>60-64</td>
<td>8,421</td>
<td>125,820,948</td>
<td>500</td>
</tr>
<tr>
<td>65-69</td>
<td>11,140</td>
<td>148,586,652</td>
<td>730</td>
</tr>
<tr>
<td>70-74</td>
<td>8,045</td>
<td>118,820,832</td>
<td>732</td>
</tr>
<tr>
<td>75-79</td>
<td>4,716</td>
<td>79,241,088</td>
<td>745</td>
</tr>
<tr>
<td>80-84</td>
<td>2,769</td>
<td>48,568,776</td>
<td>724</td>
</tr>
<tr>
<td>85-89</td>
<td>1,525</td>
<td>26,422,572</td>
<td>534</td>
</tr>
<tr>
<td>90+</td>
<td>838</td>
<td>11,846,616</td>
<td>318</td>
</tr>
<tr>
<td>Totals</td>
<td>41,365</td>
<td>$649,456,560</td>
<td>5,195</td>
</tr>
</tbody>
</table>

Average age at retirement: 60.0 years  •  Average age now: 69.9 years

**Average benefit paid:** $15,701 service benefits  •  $11,692 survivor benefits
**Total Benefits Payable**  
Tabulated by Attained Ages of Benefit Recipients | As of June 30, 2017

### Judicial Plan

<table>
<thead>
<tr>
<th>Attained Ages</th>
<th>Service Retirement</th>
<th></th>
<th>Survivors and Beneficiaries</th>
<th></th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>Annual Benefits</td>
<td>No.</td>
<td>Annual Benefits</td>
<td>No.</td>
</tr>
<tr>
<td>64 and Under</td>
<td>28</td>
<td>$1,662,084</td>
<td>13</td>
<td>$491,772</td>
<td>41</td>
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<tr>
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<td>$7,082,364</td>
<td>13</td>
<td>$463,932</td>
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<tr>
<td>70-74</td>
<td>108</td>
<td>$7,963,584</td>
<td>24</td>
<td>$816,396</td>
<td>132</td>
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<tr>
<td>75-79</td>
<td>77</td>
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<td>$647,388</td>
<td>95</td>
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<tr>
<td>80-84</td>
<td>38</td>
<td>$3,103,296</td>
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<td>$900,492</td>
<td>60</td>
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<tr>
<td>85-89</td>
<td>28</td>
<td>$2,171,892</td>
<td>39</td>
<td>$1,391,712</td>
<td>67</td>
</tr>
<tr>
<td>90+</td>
<td>16</td>
<td>$1,121,196</td>
<td>32</td>
<td>$1,184,568</td>
<td>48</td>
</tr>
<tr>
<td>Totals</td>
<td>398</td>
<td>$28,731,168</td>
<td>161</td>
<td>$5,896,260</td>
<td>559</td>
</tr>
</tbody>
</table>

Average age at retirement: 63.8 years  
Average age now: 74.1 years

### Average Annual Benefits

<table>
<thead>
<tr>
<th>Attained Ages</th>
<th>Service Benefits</th>
<th>Survivor Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>64 and Under</td>
<td>$61,452</td>
<td>$37,252</td>
</tr>
<tr>
<td>65-69</td>
<td>$62,041</td>
<td>$37,192</td>
</tr>
<tr>
<td>70-74</td>
<td>$62,790</td>
<td>$37,257</td>
</tr>
<tr>
<td>75-79</td>
<td>$63,875</td>
<td>$37,717</td>
</tr>
<tr>
<td>80-84</td>
<td>$64,098</td>
<td>$37,493</td>
</tr>
<tr>
<td>85-89</td>
<td>$65,601</td>
<td>$38,165</td>
</tr>
<tr>
<td>90+</td>
<td>$66,312</td>
<td>$38,779</td>
</tr>
</tbody>
</table>

Average benefit paid: $72,189 service benefits  
$36,623 survivor benefits
With 60 years of experience, MOSERS has matured in its primary role of providing financial security to its members. MOSERS’ net assets now total $8.1 billion and the system’s membership has increased to more than 116,000. In FY17, MOSERS paid benefits to 46,560 retirees and beneficiaries whose average monthly benefit was $1,271 ($15,253 per year). Nearly 90% of the $734 million MOSERS paid in benefits was to Missouri residents.