



# What's Your PLAN?

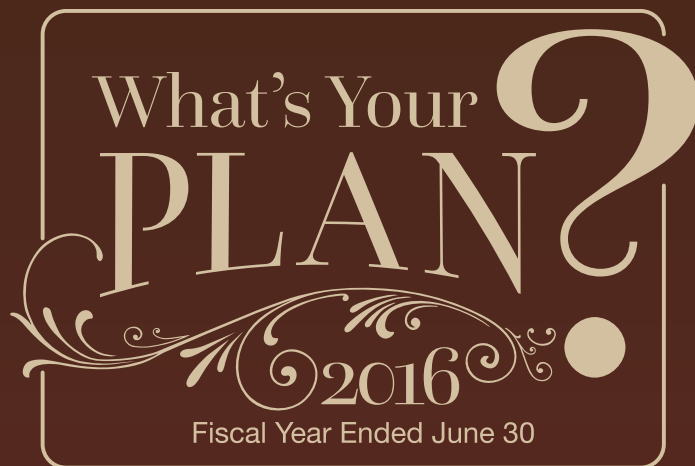
2016

Fiscal Year Ended June 30

Comprehensive Annual Financial Report



Missouri State Employees' Retirement System  
A Component Unit of the State of Missouri



Comprehensive Annual Financial Report

John Watson  
*Executive Director*

Nick Mestres  
*Chief Finance Officer*



Missouri State Employees' Retirement System  
A Component Unit of the State of Missouri

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*Photos appearing in the CAFR were taken by MOSERS staff members Brooke Rowden, Sr. Marketing Technologist and Tracy Upschulte, Sr. Strategic Communications Analyst.*

# 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



“At the time I began my employment, state government had a reputation for job security and good benefits. Twenty-five years later, the employee benefit package has proven to be one of the most valuable reasons for staying.

Additionally, I began participating in the deferred compensation plan 20+ years ago. I started saving after attending a deferred compensation seminar and understanding how the plan can work for everyone. When I was younger, I was under the illusion that you had to save millions to retire. Over the years, I learned that you don’t have to be rich, but you do need to plan. Pay yourself first. Whether you deduct monthly from your paycheck or empty your pockets every night into a jar — just start saving something. Then don’t touch it until you retire.”

— *Tiffany*

Missouri Veterans Commission  
(DPS)



*“Pay yourself first. Whether you deduct monthly from your paycheck or empty your pockets every night into a jar — just start saving something.”*

## **Introductory Section**

- 5 Professional Awards
- 6 Letter of Transmittal
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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, 2015, 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 27<sup>th</sup> 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 2015, 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).



## Letter of Transmittal



### Missouri State Employees' Retirement System

Mailing Address: PO Box 209, Jefferson City, MO 65102-0209  
Phone: (573) 632-6100 • (800) 827-1063 | Fax: (573) 632-6103  
MO Relay: 7-1-1 (Voice) • (800) 735-2966 (TTY)  
Website: [www.mosers.org](http://www.mosers.org) | Email: [mosers@mosers.org](mailto:mosers@mosers.org)  
Visit us at 907 Wildwood Drive, Jefferson City, MO

October 14, 2016

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 2016 *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 supporting procedures are maintained to provide assurances that transactions are authorized, assets are safeguarded, 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.

The *Management Discussion and Analysis* in the *Financial Section* serves as an introduction to and overview of the financial statements. 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.

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 accounted for as an internal service fund 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.

### **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.

### **Personnel Changes**

Over the 12-month period that was FY16, MOSERS experienced the retirement of long-term leadership and the selection of new staff to assume those roles. Gary Findlay, executive director, Karen Stohlgren, deputy executive director – operations and Rick Dahl, deputy executive director – investments retired in FY16 after long and distinguished careers. Mark Murphy was selected as deputy executive director – operations and Seth Kelly was selected as deputy executive director – investments. Turnover in FY16 was 15.1%, higher than experienced historically. Retirement of long-term employees contributed to increased turnover rates. In FY16, 13 employees resigned. This included six employees who retired. Currently, the average length of MOSERS' service for all employees is approximately 8.5 years and the average length of total state service for all MOSERS' employees is just over 13.4 years.

### **Risk Management Enhancements**

Risk management is a critical component of MOSERS' business activity. Our risk management consultant, Charlesworth & Associates, has opined that insurance coverage has been designed around the risks to which the system is exposed and the philosophy regarding funding of potential loss. Additionally, it is the consultant's opinion that "MOSERS continues to excel in risk management practices throughout the year." Our insurance risk management consultant helps ensure that the insurance coverage is consistent with industry standards and that MOSERS is receiving the best rates available.

### **Project Management Office**

At the November 2015 board meeting, a project manager position was approved and effective as of July 1, 2016. With this position filled, MOSERS has completed a critical step in the multi-year implementation of the new pension administration system. This new administration system will replace the current system that is almost three decades old. The process mapping conducted in FY16, as a team effort with the majority of MOSERS' staff, will be used by the vendor and our project management office to facilitate the new administration system and increase efficiency for staff and members over time.

### **Deferred Compensation and College and University Retirement Plans**

The MOSERS Board of Trustees is responsible for oversight of the State of Missouri Deferred Compensation Plan and the College and University Retirement Plan (CURP), which includes, but is not limited to, contracting with record keepers, plan administrators and investment managers, providing communications and ensuring that the plans are in compliance with federal and state law. Deferred compensation plan participation is voluntary for eligible members, including college and university employees.

As of June 30, 2016, there were 64,904 participants (39,744 active and 25,160 terminated/retired) in the State of Missouri Deferred Compensation Plan. Of all eligible employees (including public university employees), over 62% participate in the plan (up 1% from FY15). Of all eligible state employees, 73.6% participate in the plan (up 1.5% from FY15). Total participants (both active and terminated) increased by 2,863 during FY16. Plan assets total \$1,866,004,878. ICMA-RC is the plan record keeper.

The plan investment options consist of 13 custom-designed target-date investment options, a stable income fund, a brokerage window option, the MIP Fund (offering participants the ability to purchase units of MOSERS' investment portfolio), and 26 closed legacy mutual fund options (consisting of a variety of domestic equity, international equity, fixed income, and lifestyle/balanced mutual funds) available only to plan participants that opted to remain invested in those funds as of May 1, 2009. Assets in the MIP as of June 30, 2016, total \$4,693,919 held by 199 investors.

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 FY16) is 1% less than the employer normal cost of the defined benefit plan for general state employees. TIAA-CREF is responsible for third-party administration and for providing investment products and education to plan members. Current plan assets total \$67,805,615 with 2,656 participants (1,911 active and 745 terminated or retired).

### Cost Effectiveness Measurement

Customer service is a critical element in MOSERS' performance objectives. One of the ways MOSERS measures overall performance is through CEM Benchmarking, Inc. (CEM). CEM evaluated 55 leading pension systems, including systems in the United States, Canada, South Africa, Scandinavia, United Arab Emirates, and the Netherlands. MOSERS' peer group included nine U.S. public pension plans that are identified as the most relevant peer group based on membership size and system assets. This year, the CEM results indicated MOSERS' service ranked number one again in the peer group and the third highest in CEM's global universe. MOSERS' service score was 90, well above the peer median and average of 79.

CEM measures the cost of service on an annual per participant basis (including active members and benefit recipients). We have approximately 94,000 such participants while the median number within our peer group is approximately 155,000. Our cost of \$80 per active member and annuitant was equal to the peer median and well below the peer average of \$127. In addition, our overall complexity score remains below the peer median (with simplicity being viewed as a positive).

### Summary of Financial Information

The following schedule is a comparative summary of the pension trust funds' additions and deductions for the years ended June 30, 2016, and June 30, 2015.

#### *Pension Trust Funds*

	Year Ended June 30, 2016	Year Ended June 30, 2015
Additions	\$ 392,637,965	\$ 145,791,105
Deductions	(798,926,575)	(767,712,413)
Net change	<u><u>\$(406,288,610)</u></u>	<u><u>\$(621,921,308)</u></u>

The following schedule is a comparative summary of the revenues and expenses of the *Internal Service Funds* (insurance and deferred compensation activity) for the years ended June 30, 2016, and June 30, 2015.

#### *Internal Service Funds*

	Year Ended June 30, 2016	Year Ended June 30, 2015
Operating revenues	\$ 30,840,282	\$ 30,658,038
Operating expenses	(31,375,740)	(31,138,744)
Nonoperating revenue	18,777	12,549
Net change	<u><u>\$ (516,681)</u></u>	<u><u>\$ (468,157)</u></u>

Additional financial information can be found in the *Management Discussion and Analysis Report*, the financial statements, and schedules included in the *Financial Section* of this report.

### Investments

MOSERS' investments generated a time-weighted return of 0.3%, net of fees, for FY16. The total fund return trailed its policy benchmark by 7.1%. The five year annualized return of 5.6% produced a \$252 million shortfall, net of fees, of the policy benchmark for that period. Additional information regarding the investments of the pension trust funds can be found in the *Investment Section* of this report.

### Plan Financial Condition/Funded Ratio

The financial statements are prepared in accordance with U.S. generally accepted accounting principles and do not affect the funding requirements for the defined benefit plan, which continue to be calculated based on annual actuarial valuations in conformity with generally accepted actuarial principles in accordance with the actuarial standards of practice issued by the Actuarial Standards Board and applicable statutes.

The funding objective of MOSERS' pension trust funds is to meet long-term benefit promises through contributions that remain approximately level as a percent of member payroll over decades of time. Historical information relating to progress in meeting this objective is presented in the *Employer Schedule of Funding Progress* on page 100. During the year ended

June 30, 2016, the actuarial funded ratio of the Missouri State Employees' Plan, which covers 114,864 participants, declined from 75.0% to 69.6%, primarily the result of the unfavorable investment market experience and assumption and method changes based on the 2011-2015 experience study. Funding of the Judicial Plan, which covers 975 participants, began on July 1, 1998. During the year ended June 30, 2016, the actuarial funded ratio of the Judicial Plan decreased from 27.8% to 26.2%. Additional information regarding the financial condition of the pension trust funds can be found in the *Actuarial Section* of this report.

### 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, 2015. This was the 27th 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 public pension arena continues to evolve, at MOSERS, we are placing a renewed emphasis on financial security in retirement. The average MOSERS retirement benefit is approximately \$15,000 annually. Our goal is to motivate our members to realize the many components of income replacement in retirement that work in concert with MOSERS' benefit payments. We look forward to continuing the education of each and every member about the total retirement tools available to achieve financial security. It is our honor to work for this great state and to serve Missouri's public employees.

Respectfully submitted,



John Watson  
Executive Director



## Letter from the Board Chair



**Missouri State Employees' Retirement System**  
Mailing Address: PO Box 209, Jefferson City, MO 65102-0209  
Phone: (573) 632-6100 • (800) 827-1063 | Fax: (573) 632-6103  
MO Relay: 7-1-1 (Voice) • (800) 735-2966 (TTY)  
Website: [www.mosers.org](http://www.mosers.org) | Email: [mosers@mosers.org](mailto:mosers@mosers.org)  
Visit us at 907 Wildwood Drive, Jefferson City, MO

October 14, 2016

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, 2016. While the focus of this report is on information related to the financial status of your retirement system, it also highlights other changes that occurred during the year. The *Financial Section* of this report is prepared in accordance with generally accepted accounting principles and includes financial statements that are appropriately attested to by the system's independent auditors.

MOSERS' investments generated a time-weighted return of 0.3% for FY16. The annualized return since the inception of maintaining investment return data (1981) has produced a long-term rate of return of 9.87%. After two consecutive double-digit returns in FY13 and FY14, this year marks the second consecutive year of returns not meeting investment return assumptions. The ongoing volatility of the financial markets continues to present challenges for investors across the industry.

During FY16, the MOSERS Board of Trustees authorized the performance of an actuarial experience study for the five-year period ending June 30, 2015. This study compares what was assumed to occur with what actually occurred relative to MOSERS during that five year time period. The board approved results from this endeavor included:

- Reduction of the investment return assumption from 8.0% to 7.65%, with the intentional reduction of 15 basis points annually over the next four years, resulting in an investment return assumption of 7.05%,
- Adoption of an increased time period to recognize plan gains and losses (from three to five years) relative to the actuarial value of assets, and
- Strengthened mortality tables to reflect potential increased lifespan of members.

It is the board's expectation these changes will assist in strengthening MOSERS' financial position and enhance the financial security of our members. The next experience study is scheduled for 2021 covering the five-year period ending June 30, 2020.

As an organization, MOSERS has encountered significant transitions over FY16. With the retirement of long-term leadership and the selection of new staff to assume those roles, MOSERS has been provided with the opportunity to learn, grow, and assimilate new approaches into current functions. I appreciate the new and current MOSERS staff and the business-as-usual approach that has been experienced over the last year. It is clear that MOSERS' member satisfaction continues to be paramount in the staff's daily endeavors.

The board experienced turnover this year. On behalf of the board and staff, I would like to thank Lori Neidel for her hard work while serving as a trustee to the system. One new trustee was added to the board this fiscal year. Joe Carmichael was appointed by Governor Nixon and has been an active contributor to the board thus far in his tenure. It is important to remember, trustees devote many hours in fulfilling their fiduciary duties and serve with no remuneration.

I wish to thank the board for their contributions this year as well as the staff for maintaining the high level of expertise and professionalism. I also wish to express my gratitude to you, our members, for your continued public service. Your dedication and commitment to Missouri citizens is greatly appreciated. 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](http://www.mosers.org).

Sincerely,

A handwritten signature in cursive script that reads "Antwaun Smith".

Antwaun Smith, Chair — Board of Trustees

## Board of Trustees



**Antwaun Smith - Chair**  
*Governor Appointed Member*



**Representative Mike Leara - Vice Chair**  
*House Appointed Member*

**Lloyd J. "Joe" Carmichael**  
*Governor Appointed Member*

**Representative Caleb Jones**  
*House Appointed Member*

**Senator Joe Keaveny**  
*Senate Appointed Member*



**Don Martin**  
*Elected Retired Member*



**Commissioner Doug Nelson**  
**Office of Administration**  
*Ex-Officio Member*



**Shannon Owens**  
*Elected Active Member*

**Senator Wayne Wallingford**  
*Senate Appointed Member*

**Crystal Wessing**  
*Elected Active Member*

**State Treasurer Clint Zweifel**  
*Ex-Officio Member*



## Administrative Organization



**John Watson**  
*Executive Director*

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



**Mark J. Murphy**  
*Deputy Executive Director — Operations*  
*Chief Operations Officer (COO)*

- Stacy Gillmore, *Chief Technology Officer*
  - Lori Leeper, *Board & Operations Projects Coordinator*
  - Pam Palmquist, *Chief Benefits Officer*
  - Candy Smith, *Communications & Strategic Planning Coordinator*
- 



**Seth Kelly**  
*Deputy Executive Director — Investments*  
*Chief Investment Officer (CIO)*

- Shannon Davidson, *Deputy CIO*
- Omar Davis, *Investment Legal & Compliance Counsel*
- Chad Myhre, *Manager - Liquid Alpha Strategies*
- Scott Peppard, *Manager - Illiquid Alpha Strategies*
- Tyson Rehfeld, *Manager - Global Rates & Credit*
- Cindy Rehmeier, *Manager - Defined Contribution Plans*



## About MOSERS



### 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 retirement 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:

- 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.
- 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 (COO), chief finance officer (CFO) and chief investment officer (CIO) 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, COO, and CFO 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 inception, as well as contact with members regarding the benefit programs administered by MOSERS (retirement, life, 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 that are 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, and business process mapping and analysis to identify process efficiencies and mitigate risk. They strive to deliver quality products to both internal and external stakeholders, and to provide a systematic examination and improvement of MOSERS' business processes to add value and improve the effectiveness, efficiencies, and adaptability of MOSERS' operations.

## Outside Professional Services

### Actuary

- Gabriel, Roeder, Smith & Co.

### Auditor

- Williams-Keepers, LLC

### Legal Counsel

- Thompson Coburn, LLP

### Master Custodian

- Bank of New York Mellon

### Investment Management Consultants

- Alliance Bernstein Defined Contribution Investments  
*Target Date Fund Consultant*
- Blackstone Alternative Asset Management, LP  
*Hedge Fund Asset Consultant*
- Cortex Applied Research, Inc.  
*Search Firm - Board Asset Adviser*
- Purrington Moody Weil, LLP  
*Trading 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  
*Disability and Life Insurance*
- TIAA-CREF  
*College & University Retirement Plan*

### Securities Lending Advisor

- Deutsche Bank AG, New York Branch

### Information Technology Consulting

- Avtex Solutions, Inc.
- DocSTAR
- Huber & Associates, Inc.
- HyperGen, Inc.

### Human Resources Consulting

- CBIZ Benefits & Insurance Service, Inc.

### Investment Risk Management

- MSCI BarraOne

### Investment Advisors

- Actis, LLP
- Aeolus Capital Management, Ltd.
- Alinda Capital Partners, LLC
- American Industrial Partners
- AQR Capital Management, LLC
- Axiom Asia Private Capital
- Axxon Group Private Capital Associates
- Bayview Asset Management, LLC
- BlackRock Financial Management, Inc.
- Blackstone Alternative Asset Management, LP
- Blackstone Real Estate Partners
- Blakeney Management, Ltd.
- Brevan Howard Capital Management, Ltd.
- Bridgepoint Capital, Ltd.
- Bridgewater Associates, LP
- Campbell Group
- CarVal Investors, LLC
- Castlake
- Catalyst Capital Group, Inc.
- Catterton Partners

*Outside Professional Services continued on page 16*

*Outside Professional Services continued from page 15*

- Claren Road Asset Management, LLC
- Cornwall Capital Management, LP
- Davidson Kempner Capital Management, LLC
- DDJ Capital Management, LLC
- Development Partners International
- Diamondback Capital Management, LLC
- DRI Capital, Inc.
- EIG Global Energy Partners, LLC
- Elliott Management Corporation
- Empyrean Capital Partners, LP
- Eton Park Capital Management, LP
- Farallon Capital Management, LLC
- Gaoling Fund
- Glenview Capital Management, LLC
- Global Forest Partners, LP
- Harvest Fund Advisors, LLC
- HBK Capital Management, LP
- JLL Partners
- King Street Capital Management, LP
- Linden Capital Partners, LLC
- Mast Capital Management, LLC
- Merit Energy Company
- MHR Fund Management, LLC
- Millennium Technology Value Partners, LP
- Moon Capital Management, LP
- New Mountain Capital, LLC
- NISA Investment Advisors, LLC
- Oaktree Capital Management, LP
- Pacific Alternative Asset Management Company, LLC
- Perry Capital, LLC
- Pharo Global Advisors, Ltd.
- Resource Management Service, LLC
- Silchester International Investors
- Silver Creek Capital Management, LLC
- Silver Lake Management, LLC
- Silver Point Capital, LP
- SIR Capital Management, LP
- Siris Capital Group, LLC
- State Street Global Advisors
- StepStone Group
- Stone Harbor Investment Partners, LP
- TPG-Axon Management, LP
- Veritas Capital Fund Management, LLC
- Viking Global Investors, LP
- Visium Asset Management, LP
- Voya Investment Management
- Wellington Hedge Management Company, LLP

*Investment management, custodial and consulting fees can be found in the Schedule of Investment Manager Fees on page 82. Schedules of broker commissions can be found on page 86. Additional information on investment managers can also be found in the Investment Section of this report.*



“It was around my year anniversary with the state that I first started contributing to the deferred compensation program. Originally, my contribution amount was based on what I felt was reasonable and wouldn’t create a hardship at the time. When I think about how saving for retirement will benefit me in the long term, I like the idea of having more financial freedom, less stress, and less worry when I retire — that’s my driving force.

I’d rather have money later (in retirement) than right now, and I don’t miss the money I put into deferred comp.

My savings advice when it comes to retirement security and planning is to start now — it feels good to watch your money grow! Any amount is a good amount and it’s easy to adjust, up or down, as needed. I firmly believe in beginning with the end in mind. Planning today will help tomorrow be easier when money may not be as available.”

— *Kristi*

*Vocational Rehabilitation (DESE)*

*“My savings advice when it comes to retirement security and planning is to start now — it feels good to watch your money grow!”*





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## Independent Auditors' Report



2005 West Broadway, Suite 100, Columbia, MO 65203

OFFICE (573) 442-6171 FAX (573) 777-7800

3220 West Edgewood, Suite E, Jefferson City, MO 65109

OFFICE (573) 635-6196 FAX (573) 644-7240

[www.williamskeepers.com](http://www.williamskeepers.com)

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, 2016, 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, 2016, 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 52-58 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 59-66 are presented for purposes of additional analysis and are not a required part of the financial statements.

The additional information on pages 59-66 is the responsibility of management and was derived from and relate 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 on pages 59-66 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.

A handwritten signature in black ink that reads "Williams-Keeper LLC". The signature is written in a cursive, flowing style.

October 14, 2016

## Management 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, 2016. It is intended to be used in conjunction with the *Transmittal Letter* beginning on page 6 and *Financial Statements and Notes*, on pages 24-51 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 presented on an accrual basis and reflect all trust fund activities as incurred. The *Notes to 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 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.

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  $\text{Assets} - \text{Liabilities} = \text{Net Position}$  held in trust for 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  $\text{Additions} - \text{Deductions} = \text{Net Change in Net Position}$ . 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  $\text{Net Position} + \text{Liabilities} = \text{Assets}$ .
- 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  $\text{Revenues} - \text{Expenses} = \text{Net Revenue}$  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.
- The required supplementary *Management Discussion and Analysis* information, 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.
- The MSEP experienced a decrease in its actuarial funded status from 75.0% to 69.6% and the Judicial Plan experienced a decrease in its actuarial funded status from 27.8% to 26.2%. In June 2016, the board voted to reduce the nominal assumed investment return from 8% to 7.65%. Wage inflation returned from a temporary 0% assumption to 3.0% and price inflation was unchanged at 2.5%. In June 2013, the board approved a change to reduce the amortization period from an open 30 years to a closed 30 years beginning July 1, 2014, and will be reduced by one year for each subsequent annual valuation until the period reaches one year. This amortization period will be re-examined in conjunction with the 2030 actuarial valuation to determine if it should be reduced below 15 years or changed to an open 15 years.
- Also at the June 2016 meeting, the board approved a change related to the smoothing method to determine the actuarial value of assets using the investment gains or losses, relative to what would have been earned at the assumed rate on the actuarial value of assets, and combine that amount with any previously unrecognized investment gains or losses. One-fifth of that total amount would then be recognized in the current year with four-fifths deferred for future recognition. In no event would the actuarial value of assets as of the valuation date be more than 125% or less than 80% of the fair value of assets.



## Financial Reporting Highlights

- MOSERS' net position restricted for pensions decreased by \$406.3 million during fiscal year 2016 (FY16). On June 30, 2016, total plan assets (including net capital assets of \$3.5 million) were \$11.9 billion, exceeding total liabilities of \$3.7 billion, resulting in a net position held in trust for pension benefits of \$8.2 billion.
- Covered payroll, from which both employee and employer contributions are calculated, increased \$3.0 million for the Missouri State Employees' Plan (MSEP) and \$1.7 million for the Judicial Plan, or .16% and 3.1% respectively, over the last fiscal year.
- Total contributions for FY16 were \$390.9 million, up from \$386.5 million in FY15. During FY16, contribution rates were 16.97% for the MSEP and 58.45% for the Judicial Plan, which is the rate determined by the June 30, 2013 actuarial valuation. Although not prohibited to increase, future contribution rates shall not be reduced below these rates until the actuarial funding ratio of the plans are at least 80%. MOSERS will continue to use a funding policy that follows a financing pattern which computes and requires contribution amounts (when expressed as a percentage of active member payroll) to remain approximately level from year to year and from one generation of citizens to the next generation.
- Investment and securities lending income, net of related fees was \$1.2 million. Investments of the pension trust funds generated a time-weighted 0.3% return, net of fees, for the year, up from the prior year's return of (2.64)%. The money-weighted rate of return, net of investment expenses as defined by GASB 67 was 0.08% for FY16.
- Investment activity expenses were \$79.1 million in FY16 down from \$124.1 million in FY15. This decrease is due to less incentive and management fees paid to investment managers, which is related closely to the performance of the funds they manage.
- Benefit payments to members increased by \$28.2 million and service transfers and refunds increased by \$2.6 million for FY16.
- Administrative expenses totaled \$8.6 million in FY16, compared to \$8.2 million in FY15.
- The internal service fund's net position decreased by \$0.5 million. The decrease is due to reimbursement from the State of Missouri Deferred Compensation Plan's third party record keeper to cover administrative expenses occurring in a previous year, which covered FY16 and future years.

The following schedules present *Summary Comparative Financial Statements* of the pension trust funds and internal service funds for FY16 and FY15. 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, obligations under repo agreements, and securities lending collateral.

FY16 experienced a decrease in the net fair value of investments (total investments less obligations under repo agreements) of \$308 million, from \$6.1 billion in FY15 to \$5.7 billion in FY16, primarily attributable to benefit payment obligations exceeding investment returns as evidenced by MOSERS' total investment return, net of fees, of 0.3% this year. Detailed information regarding MOSERS' investment portfolio is included in the *Investment Section* of this report.

Obligations under repo agreements decreased from \$4.2 billion in FY15 to \$3.6 billion in FY16 due to decreased exposure financed with reverse repos.

Cash and short-term investments increased due to multiple factors including the performance of the fund, the timing of investment funding and obligations under derivative investments and reverse repo agreements.

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

The decrease in securities lending collateral is primarily attributable to a lower utilization rate of lendable assets in the lending portfolio at fiscal year-end. As of fiscal year-end, approximately 0.15% of the collateral received has been invested in asset-backed bonds, down from 0.20% the prior year. The invested collateral was \$0.7 million below the liability at the end of FY15 and FY16.

*Pension Trust Funds***Summary Comparative Statements of Fiduciary Net Position**

	As of June 30, 2016	As of June 30, 2015	Amount of Change	Percentage Change
Cash and short-term investments	\$ 2,454,419,406	\$ 2,237,194,552	\$ 217,224,854	9.71%
Receivables	89,911,461	373,465,032	(283,553,571)	(75.93)
Investments	9,349,306,746	10,258,761,342	(909,454,596)	(8.87)
Invested securities lending collateral	14,258,587	19,228,051	(4,969,464)	(25.84)
Net capital assets	3,541,901	3,701,791	(159,890)	(4.32)
Other assets	68,128	26,425	41,703	157.82
<b>Total assets</b>	<b>11,911,506,229</b>	<b>12,892,377,193</b>	<b>(980,870,964)</b>	<b>(7.61)</b>
Administrative expense payables	2,419,569	1,399,712	1,019,857	72.86
Investment purchase payables	36,690,153	1,598,102	35,092,051	2,195.86
Securities lending collateral	14,940,141	19,918,342	(4,978,201)	(24.99)
Other liabilities	10,083,285	14,257,651	(4,174,366)	(29.28)
Obligations under repo agreements	3,601,461,597	4,203,408,628	(601,947,031)	(14.32)
MOSERS investment portfolio liability (MIP)	4,693,919	4,288,583	405,336	9.45
<b>Total liabilities</b>	<b>3,670,288,664</b>	<b>4,244,871,018</b>	<b>(574,582,354)</b>	<b>(13.54)</b>
<b>Net positions restricted for pensions</b>	<b>\$ 8,241,217,565</b>	<b>\$ 8,647,506,175</b>	<b>\$(406,288,610)</b>	<b>(4.70)</b>

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

The increase in contributions received is primarily attributable to an increase in covered payroll from FY15 to FY16.

The increase in investment income from FY15 to FY16 is attributable to a slight improvement in market conditions experienced by the investments of the fund. The decrease in securities lending income is primarily due to less lendable assets in the lending portfolio during the fiscal year. Margins continue to be low, resulting in low income generation. 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 104-109 of the *Actuarial Section* of this report.

Service transfers increased \$1.3 million in FY16 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 FY16 by \$1.3 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**

	Year Ended June 30, 2016	Year Ended June 30, 2015	Amount of Change	Percentage Change
Contributions	\$ 390,869,615	\$ 386,471,986	\$ 4,397,629	1.14%
Investment income (loss) – investing activities	1,213,744	(241,338,203)	242,551,947	100.50
Investment (loss) income – securities lending activities	(49)	116,204	(116,253)	(100.04)
Miscellaneous income	554,655	541,118	13,537	2.50
<b>Total additions</b>	<b>392,637,965</b>	<b>145,791,105</b>	<b>246,846,860</b>	<b>169.32</b>
Benefits	783,420,118	755,239,947	28,180,171	3.73
Service transfers and refunds	6,880,099	4,271,759	2,608,340	61.06
Administrative expenses	8,626,358	8,200,707	425,651	5.19
<b>Total deductions</b>	<b>798,926,575</b>	<b>767,712,413</b>	<b>31,214,162</b>	<b>4.07</b>
<b>Net (decrease) increase</b>	<b>(406,288,610)</b>	<b>(621,921,308)</b>	<b>215,632,698</b>	<b>34.67</b>
<b>Net positions beginning of year</b>	<b>8,647,506,175</b>	<b>9,269,427,483</b>	<b>(621,921,308)</b>	<b>(6.71)</b>
<b>Net positions restricted for pensions</b>	<b>\$8,241,217,565</b>	<b>\$8,647,506,175</b>	<b>\$(406,288,610)</b>	<b>(4.70)</b>

### *Internal Service Funds*

#### **Summary Comparative Statements of Net Position Analysis**

The decrease 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 decrease in investments is attributable to reimbursement from the State of Missouri Deferred Compensation Plan's third-party record keeper to cover administrative expenses occurring in a previous year, which covered FY16 and future years.

The increase in premiums payable is attributable to normal fluctuations in the month-end balances of premiums payable for the year, similar to the fluctuations of the premiums receivable.

Other liabilities decreased primarily as a result of the timing of reimbursements due to the pension trust funds for the internal service fund's portion of shared expenses which had not been transferred at year end.

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

Premium receipts and premium disbursements increased slightly due to normal fluctuations in the amount of optional life insurance coverage selected by state employees. These amounts are collected when employee wages are paid and remitted to The Standard insurance company on a monthly basis.

Deferred compensation receipts and disbursements were \$0 for both FY15 and FY16. This is attributable to a \$1 million reimbursement paid in FY14 to cover 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, 2016, there were 64,904 participants (both active and terminated/retired), which is an increase of 2,863 from FY15. The state of Missouri has not contributed an employer match since March 2010.

Administrative expenses increased primarily as a result of personnel services allocated to Life and LTD *Internal Service Funds*, and an increase in personnel services directly related to the Deferred Compensation *Internal Service Funds*.

#### **Summary Comparative Statements of Cash Flows Analysis**

The decrease in cash flows from operating activities is primarily attributable to an increase in cash payments paid to outside carriers over that of FY15 of \$.5 million and an increase for payments to employees for services of \$.5 million, which are partially offset by an increase in payments received from employers and members of \$.2 million.

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

The increase in cash flows from investing activities is attributable to several factors including the decrease in outflows for net purchase and maturities of overnight repurchase agreements of \$.5 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 request for additional information should be addressed to MOSERS at P.O. Box 209, Jefferson City, MO 65102 or by email at [mosers@mosers.org](mailto:mosers@mosers.org).

*Internal Service Funds***Summary Comparative Statements of Net Position**

	As of June 30, 2016	As of June 30, 2015	Amount of Change	Percentage Change
Premiums receivable	\$ 962,006	\$ 978,693	\$ (16,687)	(1.71)%
Investments	3,935,042	4,482,083	(547,041)	(12.21)
Fixed assets net of accumulated depreciation	3,946	4,437	(491)	(11.07)
Leasehold improvements	1,940	2,910	(970)	(33.33)
<b>Total assets</b>	<b>\$4,902,934</b>	<b>\$5,468,123</b>	<b>\$(565,189)</b>	<b>(10.34)</b>
Premiums payable	\$4,550,931	\$4,394,941	\$ 155,990	3.55
Other liabilities	123,378	327,876	(204,498)	(62.37)
<b>Total liabilities</b>	<b>4,674,309</b>	<b>4,722,817</b>	<b>(48,508)</b>	<b>(1.03)</b>
<b>Unrestricted net position</b>	<b>228,625</b>	<b>745,306</b>	<b>(516,681)</b>	<b>(69.32)</b>
<b>Total liabilities and net position</b>	<b>\$4,902,934</b>	<b>\$5,468,123</b>	<b>\$(565,189)</b>	<b>(10.34)</b>

*Internal Service Funds***Summary Comparative Statements of Revenues, Expenses, and Changes in Net Position**

	Year Ended June 30, 2016	Year Ended June 30, 2015	Amount of Change	Percentage Change
Premium receipts	\$30,360,162	\$30,177,918	\$ 182,244	0.60%
Miscellaneous income	480,120	480,120	0	0.00
<b>Total operating revenue</b>	<b>30,840,282</b>	<b>30,658,038</b>	<b>182,244</b>	<b>0.59</b>
Premium disbursements	30,328,802	30,157,271	171,531	0.57
Premium refunds	31,360	20,646	10,714	51.89
Administrative expenses	1,015,578	960,827	54,751	5.70
<b>Total operating expenses</b>	<b>31,375,740</b>	<b>31,138,744</b>	<b>236,996</b>	<b>0.76</b>
<b>Net operating (loss)</b>	<b>(535,458)</b>	<b>(480,706)</b>	<b>(54,752)</b>	<b>(11.39)</b>
Investment income	18,777	12,549	6,228	49.63
<b>Net revenues (under) expenses</b>	<b>(516,681)</b>	<b>(468,157)</b>	<b>(48,524)</b>	<b>(10.36)</b>
<b>Net position beginning of year</b>	<b>745,306</b>	<b>1,213,463</b>	<b>(468,157)</b>	<b>(38.58)</b>
<b>Net position end of year</b>	<b>\$ 228,625</b>	<b>\$ 745,306</b>	<b>\$(516,681)</b>	<b>(69.32)</b>

*Internal Service Funds***Summary Comparative Statements of Cash Flows**

	Year Ended June 30, 2016	Year Ended June 30, 2015	Amount of Change	Percentage Change
Cash flows from operating activities	\$(566,218)	\$ 244,691	\$(810,909)	(331.40)%
Cash flows from noncapital financing activities	1,596	(812)	2,408	296.55
Cash flows from investing activities	564,622	(243,879)	808,501	331.52
<b>Net change in cash</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>Cash balances beginning of year</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>Cash balances end of year</b>	<b>\$ 0</b>	<b>\$ 0</b>	<b>\$ 0</b>	



## BASIC FINANCIAL STATEMENTS

## Pension Trust Funds

## Statements of Fiduciary Net Position | As of June 30, 2016

	MSEP	Judicial Plan	Total
<b>Assets</b>			
Cash and short-term investments	\$ 2,415,444,202	\$ 38,975,204	\$ 2,454,419,406
<u>Receivables</u>			
State contributions	14,435,893	1,441,218	15,877,111
Investment sales	36,445,191	588,074	37,033,265
Investment income receivable	36,300,888	585,745	36,886,633
Other	112,635	1,817	114,452
Total receivables	87,294,607	2,616,854	89,911,461
<u>Investments at fair value</u>			
U.S. treasury securities	3,895,855,245	62,862,868	3,958,718,113
Government bonds & gov't. mortgage-backed securities	46,850,062	755,965	47,606,027
Corporate bonds	109,828	1,772	111,600
Convertible bonds	953,401	15,384	968,785
U.S. dollar-denominated international corporate bonds	1,243,066	20,058	1,263,124
Limited partnerships	4,199,654,679	67,764,925	4,267,419,604
Common stock	282,345,885	4,555,886	286,901,771
International equities	776,612,307	12,531,286	789,143,593
Foreign currency	7,697,483	124,205	7,821,688
Real estate investment trust	10,477	169	10,646
Options futures	(10,488,957)	(169,248)	(10,658,205)
Total investments	9,200,843,476	148,463,270	9,349,306,746
Invested securities lending collateral	14,032,166	226,421	14,258,587
<u>Capital assets</u>			
Land	263,042	4,244	267,286
Building and building improvements	4,216,303	68,034	4,284,337
Furniture, fixtures and equipment	1,265,221	20,415	1,285,636
Software	713,057	11,506	724,563
Total capital assets	6,457,623	104,199	6,561,822
Accumulated depreciation	(2,971,966)	(47,955)	(3,019,921)
Net capital assets	3,485,657	56,244	3,541,901
Prepaid expenses and other	67,046	1,082	68,128
Total assets	11,721,167,154	190,339,075	11,911,506,229
<b>Liabilities</b>			
Administrative expenses payable	2,381,147	38,422	2,419,569
Investment purchases payable	36,107,528	582,625	36,690,153
Securities lending collateral	14,702,898	237,243	14,940,141
Investment incentive fees payable	9,405,806	151,771	9,557,577
Employee vacation and overtime liability	517,360	8,348	525,708
Obligations under repo agreements	3,544,271,820	57,189,777	3,601,461,597
MOSERS investment portfolio liability (MIP)	4,619,381	74,538	4,693,919
Total liabilities	3,612,005,940	58,282,724	3,670,288,664
<b>Net Position</b>			
Net position, investment in capital assets	3,485,657	56,244	3,541,901
Restricted for pension benefits	8,105,675,557	132,000,107	8,237,675,664
Net position restricted for pensions	\$ 8,109,161,214	\$132,056,351	\$ 8,241,217,565

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, 2016

	MSEP	Judicial Plan	Total
<b>Additions</b>			
<u>Contributions</u>			
State contributions	\$ 329,957,369	\$ 33,642,498	\$ 363,599,867
Employee contributions	21,684,920	661,206	22,346,126
Member purchases of service credit	2,815,749	0	2,815,749
Service transfer contributions	2,107,873	0	2,107,873
Total contributions	356,565,911	34,303,704	390,869,615
<u>Investment income</u>			
<i>From investing activities</i>			
Net appreciation in fair value of investments	23,165,453	373,794	23,539,247
Interest	19,177,879	309,451	19,487,330
Dividends	3,475,864	56,086	3,531,950
Other	33,176,735	535,334	33,712,069
Total investing activity income	78,995,931	1,274,665	80,270,596
Investing activity expenses:			
Management fees	(72,741,363)	(1,173,742)	(73,915,105)
Custody fees	(397,800)	(6,419)	(404,219)
Consultant fees	(860,950)	(13,892)	(874,842)
Performance measurement fees	(434,428)	(7,010)	(441,438)
Internal investment activity expenses	(3,366,920)	(54,328)	(3,421,248)
Total investing activity expenses	(77,801,461)	(1,255,391)	(79,056,852)
Net income from investing activities	1,194,470	19,274	1,213,744
<i>From securities lending activities</i>			
Securities lending income	41,609	671	42,280
Securities lending expenses:			
Borrower rebates	95,022	1,533	96,555
Management fees	(136,679)	(2,205)	(138,884)
Total securities lending activities expenses	(41,657)	(672)	(42,329)
Net (loss) from securities lending activities	(48)	(1)	(49)
Total net investment income	1,194,422	19,273	1,213,695
Miscellaneous income	545,847	8,808	554,655
Total additions	358,306,180	34,331,785	392,637,965
<b>Deductions</b>			
Benefits	672,219,486	32,979,706	705,199,192
BackDROP & lump sum benefits	78,220,926	0	78,220,926
Service transfer payments	3,071,892	0	3,071,892
Contribution refunds	3,798,199	10,008	3,808,207
Administrative expenses	8,489,375	136,983	8,626,358
Total deductions	765,799,878	33,126,697	798,926,575
Net (decrease) increase in net position	(407,493,698)	1,205,088	(406,288,610)
Net position restricted for pensions:			
Beginning of year	8,516,654,912	130,851,263	8,647,506,175
End of year	\$8,109,161,214	\$132,056,351	\$8,241,217,565

See accompanying *Notes to the Financial Statements*.

## BASIC FINANCIAL STATEMENTS

## Internal Service Funds

## Statements of Net Position | As of June 30, 2016

	Life & LTD	Deferred Compensation	Total
<b>Assets</b>			
Premiums receivable	\$ 962,006	\$ 0	\$ 962,006
Investments at fair value	3,639,529	295,513	3,935,042
Capital assets	0	12,466	12,466
Accumulated depreciation — capital assets	0	(8,520)	(8,520)
Leasehold improvements	0	3,880	3,880
Accumulated depreciation — leasehold	0	(1,940)	(1,940)
Total assets	\$4,601,535	\$301,399	\$4,902,934
<b>Liabilities and net position</b>			
<i>Liabilities</i>			
Premiums payable	\$4,550,931	\$ 0	\$4,550,931
Checks outstanding net of deposits	2,125	0	2,125
Other	114,418	6,835	121,253
Total liabilities	4,667,474	6,835	4,674,309
<i>Unrestricted net position (deficit)</i>	(65,939)	294,564	228,625
Total liabilities and net position	\$4,601,535	\$301,399	\$4,902,934

See accompanying *Notes to the Financial Statements*.

## Internal Service Funds

Statements of Revenues, Expenses,  
and Changes in Net Position | For Year Ended June 30, 2016

	Life & LTD	Deferred Compensation	Total
<b>Operating revenues</b>			
Premium receipts	\$30,360,162	\$ 0	\$30,360,162
Miscellaneous income	480,120	0	480,120
Total operating revenues	30,840,282	0	30,840,282
<b>Operating expenses</b>			
Premium disbursements	30,328,802	0	30,328,802
Premium refunds	31,360	0	31,360
Administrative expenses	550,843	464,735	1,015,578
Total operating expenses	30,911,005	464,735	31,375,740
Operating revenues (under) operating expenses	(70,723)	(464,735)	(535,458)
<b>Non-operating revenues</b>			
Investment income	15,207	3,570	18,777
Net revenues (under) expenses	(55,516)	(461,165)	(516,681)
Net position (deficit) July 1, 2015	(10,423)	755,729	745,306
Net position (deficit) June 30, 2016	\$ (65,939)	\$ 294,564	\$ 228,625

See accompanying *Notes to the Financial Statements*.

## BASIC FINANCIAL STATEMENTS

## Internal Service Funds

## Statements of Cash Flows | Year Ended June 30, 2016

	Life & LTD	Deferred Compensation	Total
<b>Cash flows from operating activities</b>			
Cash received from employer and members	\$ 30,856,965	\$ 0	\$ 30,856,965
Payments to outside carriers	(30,174,726)	0	(30,174,726)
Refunds of premiums to members	(31,360)	0	(31,360)
Cash payments to employees for services	(343,794)	(317,349)	(661,143)
Cash payments to other suppliers of goods and services	(418,060)	(137,894)	(555,954)
Net cash (used) by operating activities	(110,975)	(455,243)	(566,218)
<b>Cash flows from noncapital financing activities</b>			
Implicit funding of checks outstanding net of deposits	2,125	0	2,125
Implicit repayment of prior years checks outstanding net of deposits	(529)	0	(529)
Net cash provided by noncapital financing activities	1,596	0	1,596
<b>Cash flows from investing activities</b>			
Purchase of investment securities	(1,098,605,133)	0	(1,098,605,133)
Proceeds from sale and maturities of investment securities	1,098,699,305	452,869	1,099,152,174
Cash received from investment income	15,207	3,570	18,777
Purchase of capital assets	0	(1,196)	(1,196)
Net cash provided by investing activities	109,379	455,243	564,622
Net increase in cash	0	0	0
Cash balances June 30, 2015	0	0	0
Cash balances June 30, 2016	\$ 0	\$ 0	\$ 0
<b>Reconciliation of operating revenues under operating expenses to net cash (used) by operating activities</b>			
Operating revenues (under) operating expenses	\$ (70,723)	\$(464,735)	\$ (535,458)
<i>Adjustments to reconcile operating revenues over (under) operating expenses to net cash provided (used) by operating activities</i>			
Depreciation expense	0	2,658	2,658
Change in assets and liabilities:			
Increase in operational accounts receivable	16,683	0	16,683
Increase (decrease) in operational accounts payable	(56,935)	6,834	(50,101)
Total adjustments	(40,252)	9,492	(30,760)
Net cash (used) by operating activities	\$ (110,975)	\$(455,243)	\$ (566,218)

See accompanying *Notes to the Financial Statements*.



## Notes to the Financial Statements | Year Ended June 30, 2016

### (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, 2016, 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, are added to any previously unrecognized gains or losses and one-fifth of that total amount was recognized in the June 30, 2016 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.

For the actuarial valuation, the nominal investment return assumption is 7.65% and wage inflation and price inflation are 3% and 2.5%, respectively. 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, 2016, and 2015, the ratio of actuarial to fair value of assets was 109% and 103%, respectively for the MSEP.

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

#### As of the June 30, 2016 valuation, membership\* in the MSEP consisted of the following:

Retirees and beneficiaries currently receiving benefits	44,828
Terminated employees entitled to, but not yet receiving benefits	19,512
Active	
Vested	32,111
Nonvested	17,353
Total membership	<u>49,464</u> <u>113,804</u>

\* Excludes 132 members on leave of absence and 928 members on long-term disability.

**MSEP (closed plan)**

General state employees are fully vested for benefits upon receiving 5 years of credited service. Under the MSEP (closed plan), 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.

For members hired prior to August 28, 1997, cost-of-living adjustments (COLAs) are provided 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. For members hired on or after August 28, 1997, 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%.

Qualified, terminated-vested members may make a one-time election to receive the present value of their benefit in a lump sum payment. A member must have terminated with at least 5, but less than 10 years of service, not within five years of retirement eligibility, be less than age 60, and with a benefit present value of less than \$10,000.

Contributions are determined through annual actuarial valuations. Contributions for FY16 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%. Contributions will continue at the policy minimum of 16.97% through the year ended June 30, 2017. Administration of the MSEP is financed through contributions to this plan from the state of Missouri and its component employers and investment earnings.

**MSEP 2000**

General state employees are fully vested for benefits upon receiving 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 final average pay multiplied by years of credited service.

For those retiring under “Rule of 80,” an additional temporary benefit equivalent to 0.8% multiplied by final average pay multiplied by years of credited service 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%.

Contributions are determined through annual actuarial valuations. Contributions for FY16 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%. Contributions will continue at the policy minimum of 16.97% through the year ended June 30, 2017. Administration of the MSEP 2000 is financed through contributions to this plan from the state of Missouri and its component employers and investment earnings.

The state of Missouri is required to make all contributions to the MSEP. 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 2011**

On July 19, 2010, an additional tier of the MSEP 2000 defined benefit plan was signed into law for members of MOSERS. This tier (MSEP 2011) includes all new employees first hired on or after January 1, 2011.

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.

For those retiring under "Rule of 90," an additional temporary benefit equivalent to 0.8% multiplied by final average pay multiplied by years of credited service 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%.

Member contributions are 4% of pay. Employer contributions are determined through annual actuarial valuations.

Contributions for FY16 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 MSEP is at least 80%.

Contributions will continue at the policy minimum of 16.97% through the year ended June 30, 2017. Administration of the MSEP 2011 is financed through contributions to this plan from the member, state of Missouri and its component employers, and investment earnings.

The MSEP 2011 does not impact employees employed by the state prior to January 1, 2011.

For a detailed 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.

For the actuarial valuation of the Judicial Plan, the nominal investment return assumption is 7.65% and wage inflation and price inflation are 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 retirement, survivor, and disability benefits. Members are immediately eligible for benefits.

**As of the June 30, 2016 valuation, membership\* in the Judicial Plan consisted of the following:**

Retirees and beneficiaries currently receiving benefits	540
Terminated employees entitled to, but not yet receiving benefits	26
Active	
Vested	408
Nonvested	0
Total membership	<u>974</u>

\* Excludes 1 member on long-term disability.

Under the Judicial Plan, members 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.

For members hired prior to August 28, 1997, COLAs are provided 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. For members hired on or after August 28, 1997, 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%.

Qualified, terminated-vested members may make a one-time election to receive the present value of their benefit in a lump sum payment. A member must have terminated with at least 5, but less than 10 years of service, not be within five years of retirement eligibility, and have a benefit present value of less than \$10,000.

Funding of the Judicial Plan on an actuarial basis began on July 1, 1998. Contributions are determined through annual actuarial valuations. Contributions for FY16 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%. Contributions will continue at the policy minimum of 58.45% through the year ended June 30, 2017. 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.

### **Judicial Plan 2011 Tier**

On July 19, 2010, an additional tier of the Judicial defined benefit 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 certain eligible members. For a more detailed description of insurance benefits, refer to page 121-122 in 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

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, 2016 were \$1,866,004,878.

Record keeping of individual accounts and management of investment options are paid from charges to the participants and investment option 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 communication to plan participants. In FY16, a total of \$2,779,514 was collected from a combination of \$1,918,908 in investment option reimbursements and \$860,606 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, 2016, 12,637 currently active employees have been automatically enrolled in the plan since inception. There are 11,359 employees who continue to contribute to the plan, making the opt-out rate 10.1%.

The State of Missouri Deferred Compensation Plan offers participants the ability to purchase units of MOSERS' investments as an investment option. As of June 30, 2016, 199 participants have \$4,693,919 invested in the MOSERS Investment Portfolio (MIP) fund.

Audited financial statements for the State of Missouri Deferred Compensation Plan can be viewed at [www.moderredcomp.org](http://www.moderredcomp.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 for fiduciary funds.

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 .05%, or \$4,693,919, of the units invested in the MIP by Deferred Compensation participants. The schedule on page 47 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.

GASB Statement No. 72, Fair Value Measurement and Application, which was adopted during the year ended June 30, 2016, addresses accounting and reporting issues related to fair value measurements. This statement requires disclosures to be made about fair value measurements, the level of fair value hierarchy, and valuation techniques. Comprehensive footnote disclosures regarding this statement can be found in note (3) *Cash and Investments*.

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.

### (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

	Cash Balances	
	Book	Bank/Investment Custodian
Pension trust funds - investment custodian	\$ (40,581)	\$(40,581)
Pension trust funds - demand deposits	(9,681,027)	66,551
Internal service fund - insurance plan demand deposits	(2,125)	106

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, 2016, as collateral for overnight repurchase agreements:

#### Collateral for Overnight Repurchase Agreements

	Maturity	Pledged	Fair Value
Federal Home Loan Mortgage Corp.	1/12/2018	\$5,000,000	\$5,008,550
Federal Home Loan Mortgage Corp.	2/27/2018	5,000,000	5,013,450
Federal National Mortgage Association	3/13/2018	3,000,000	3,028,680
Federal Home Loan Mortgage Corp.	8/18/2018	2,436,000	2,459,751
Small Business Association Pool	6/25/2019	839,007	865,301
Small Business Association Pool	10/25/2027	2,201,670	2,247,685
Small Business Association Pool	12/25/2036	905,703	964,537
Small Business Association Pool	4/25/2039	3,624,134	4,029,301

## 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.

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 1.25 times of beta-balanced capital. The limit may also be stated as 225% 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, 2016.

### Schedule of Internally Managed Leverage

Internal beta-balanced portfolio	Fair Value of Internally Managed Beta-Balanced Capital	Percent of Investments at Fair Value	Market Exposure	Percent of Investments at Market Exposure*	Policy Exposure Beta-Balanced
Beta-balanced equities	\$1,156,949,774	20.3%	\$ 1,358,911,157	23.8%	24%
Beta-balanced nominal bonds	669,269,342	11.7	2,222,780,778	38.9	46
Beta-balanced commodities	364,077,818	6.4	1,155,946,291	20.2	21
Beta-balanced inflation linked bonds	1,329,465,125	23.3	4,189,752,830	73.4	80
Beta-balanced alternative beta	2,188,780,688	38.3	2,093,608,307	36.7	39
Total internal beta-balanced portfolio	\$5,708,542,747	100.0%	\$11,020,999,363	193.0%	210%

\* The actual amount of leverage in the internally managed beta-balance portfolio was 0.93 and 1.17 times beta-balanced capital or 193% and 217% as of June 30, 2016, and 2015, respectively.

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, 2016, are summarized in the table below.

### Target Asset Allocation

	Policy Allocation	Long-Term Expected Real Rate of Return*	Weighted Average Long-Term Expected Real Rate of Return
Beta-balanced portfolio	80.0%	5.7%	4.6%
Illiquids portfolio**	20.0	7.3	1.5
	100.0%		6.1%

\* Represents best estimates of geometric rates of return for each major asset class included.

\*\* Illiquid portfolio upper limit of 27.5% of capital, no new commitments past 23%.

### 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 0.08% for the year ended June 30, 2016. 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 tables on pages 36 and 37 show 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 non-proprietary information that was 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

June 30, 2016	Total	Fair Value Measurement Using		
		(Level 1)	(Level 2)	(Level 3)
<b>Investments by fair value level</b>				
<b>Assets</b>				
<i>Equity securities</i>				
U.S. common and preferred stock	\$ 110,273,551	\$ 110,273,542	\$ 0	\$9
Foreign stocks	2,817,431	2,817,431	0	0
Private equity investments	33,584,736	0	33,584,736	0
Total equity securities	146,675,718	113,090,973	33,584,736	9
<i>Debt securities</i>				
U.S. short-term funds	589,280,000	589,280,000	0	0
Repurchase agreements	1,020,000,000	0	1,020,000,000	0
U.S. agency obligations	512,553,980	0	512,553,980	0
Foreign debt securities	48,740,764	0	48,740,764	0
U.S. government	4,308,956,216	4,308,844,616	111,600	0
Total debt securities	6,479,530,960	4,898,124,616	1,581,406,344	0
Total investment assets	6,626,206,678	5,011,215,589	1,614,991,080	9
<b>Liabilities</b>				
Reverse repurchase agreements	(3,601,461,597)	0	(3,601,461,597)	0
Total net investment assets by fair value level	3,024,745,081	5,011,215,589	(1,986,470,517)	9
<b>Investment derivative instruments</b>				
Futures contracts	(16,251,526)	(16,251,526)	0	0
Options contracts	(10,658,205)	(10,658,205)	0	0
Foreign exchange forward contracts	283,152	283,152	0	0
Swap market value	46,713,441	0	46,713,441	0
Total investment derivative instruments	20,086,862	(26,626,579)	46,713,441	0
<b>Invested securities lending collateral</b>				
U.S. short-term funds	1,150,731	1,150,731	0	0
Commingled fund	37,210	0	37,210	0
Repurchase agreements	13,070,637	0	13,070,637	0
Total invested securities lending collateral	14,258,578	1,150,731	13,107,847	0
<b>Investments measured at the net asset value (NAV)</b>				
Commingled international equity funds	1,015,154,207			
Hedge funds	2,682,202,360			
Private equity funds	1,038,341,403			
Private real estate funds	192,594,190			
Private timber funds	269,476,522			
Total investments measured at NAV	5,197,768,682			
<b>Other Investments</b>				
STIF not leveled (payable for investment purchased and other misc.)	(25,763,203)			
Other cash	7,722,350			
Other not leveled	3,315,939			
Total other investments	(14,724,914)			
<b>Total fund value excluding securities lending collateral</b>	<b>\$ 8,227,875,711</b>			
<b>Reconciliation to <i>Statement of Fiduciary Net Position</i></b>				
Total portfolio value	\$ 8,227,875,711			
Reverse repurchase agreements	3,601,461,597			
STIF	(2,454,472,797)			
Uninvested cash	40,581			
Interest and dividends receivable	(53,130,415)			
Variation margin	16,251,526			
Accounts receivable securities sold	(37,033,265)			
Accounts payable securities purchased	36,690,153			
Fees payable	10,942,073			
Securities lending liability	681,582			
Investments per <i>Statement of Fiduciary Net Position</i>	\$ 9,349,306,746			

## Investments Measured at the Net Asset Value

	June 30, 2016	Unfunded Commitments	Redemption Frequency (If Currently Eligible)	Redemption Notice Period (Days)
Commingled international equity funds <sup>1</sup>	\$1,015,154,207		Daily, Monthly	1-30
Active hedge funds				
Long/short equity <sup>2</sup>	323,863,713		Quarterly, Semi-Annually, Annually	30-60
Merger arbitrage <sup>3</sup>	52,905,567		Monthly	45
Multi-strategy <sup>4</sup>	70,233,163		Quarterly	65
Equity market neutral <sup>5</sup>	93,088,991		Quarterly	90
Long/short credit <sup>6</sup>	49,671,221		Quarterly	75
Event driven <sup>7</sup>	168,584,338		Quarterly	60-65
Macro <sup>8</sup>	192,630,891		Monthly, Quarterly	30
Risk premia <sup>9</sup>	390,077,788		Bi-Weekly, Monthly	15-30
Risk parity <sup>10</sup>	887,779,412		Monthly	5-15
Fund-of-funds <sup>11</sup>	348,119,832		Monthly	95
Pending liquidated hedge funds <sup>12</sup>	105,247,444			
Private equity funds <sup>13</sup>	1,038,341,403	\$437,652,900		€ 868,751
Private real estate funds <sup>13</sup>	192,594,190	20,028,847		
Private timber funds <sup>13</sup>	269,476,522	0		
Total investments measured at NAV	\$5,197,768,682	\$457,681,747		€ 868,751

<sup>1</sup> **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 upon the fair value of the underlying investments.

<sup>2</sup> **Long/short equity hedge funds** – Consisting of four 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 for anywhere ranging from four to 30 months.

<sup>3</sup> **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.

<sup>4</sup> **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.

<sup>5</sup> **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.

<sup>6</sup> **Long/short credit hedge fund** – Consisting of one fund, this strategy invests in corporate bonds and leveraged loans within the U.S. and Europe with the goal of generating attractive risk adjusted returns. This investment is valued at NAV, is redeemable quarterly, and is not subject to lock-up restrictions.

<sup>7</sup> **Event driven hedge funds** – Consisting of two funds, this strategy seeks to gain an advantage from pricing inefficiencies that may occur in the onset or aftermath of a corporate action or related event. These investments are valued at NAV. Due to contractual lock-up restrictions, approximately 16% of the value of these investments are eligible for redemption quarterly. The remaining 84% of the value of these investments remain restricted for 24 months.

<sup>8</sup> **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.

<sup>9</sup> **Risk premia hedge funds** – Consisting of two funds, these strategies seek to capture hedge fund betas through the use of systematic, bottoms 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.

<sup>10</sup> **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.

<sup>11</sup> **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.

<sup>12</sup> **Pending liquidated hedge funds** – Consisting of 13 funds which have been fully redeemed as of June 30, 2016, for which MOSERS is awaiting final distribution of the proceeds. Approximately 83% of the value was received within 90 days of June 30, 2016. 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.

<sup>13</sup> **Private equity, real estate and timber funds** – MOSERS' private equity portfolio consists of 60 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 invests 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 as underlying investments within the funds are liquidated, which on average can occur over the span of five 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, 2016, MOSERS' fixed income assets that are not government guaranteed represented 33.6% of the fixed income securities. In preparing this report, credit risk associated with all fixed income holdings including collateral for repurchase agreements and securities lending collateral has been included. The tables below summarize MOSERS' fixed income security exposure levels and credit qualities.

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 can be viewed in the derivatives disclosures on page 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 44 of these notes.

### Average Credit Quality and Exposure Levels of Nongovernment Guaranteed Securities

Fixed Income Security Type	Fair Value June 30, 2016	Percent of all Fixed Income Assets	Weighted Average Credit Quality	Ratings Dispersion Requiring Further Disclosure
Collateralized mortgage obligations	\$ 36,823,710	0.6%	AA	See below
Implicit U.S. government agencies	475,752,040	7.3	AA	See below
Non-U.S. sovereign	48,499,083	0.7	BBB	See below
Asset-backed securities	37,210	0.0	Not rated	See below
Corporate bonds	1,391,576	0.0	BBB	See below
Bank deposits	550,000,000	8.5	FDIC insured	None
Repurchase agreements	1,033,084,559	15.9	Not rated	None
Pooled investments	40,430,731	0.6	AAA	None
Total nongov't. guaranteed securities	\$2,186,018,909	33.6%		
Total fixed income securities	\$6,508,184,108			

### Ratings Dispersion Detail - Fair Value

Credit Rating Level	Collateralized Mortgage Obligations	Non-U.S. Sovereign	Asset-Backed Securities	Corporate Bonds	Implicit U.S. Agencies
AA	\$36,823,710			\$ 18,031	\$475,752,040
A		\$13,847,733		150,002	
BBB		23,398,675		1,115,693	
BB		11,252,675			
Not Rated			\$37,210	107,850	
	\$36,823,710	\$48,499,083	\$37,210	\$1,391,576	\$475,752,040

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.

### 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

Fixed Income Security Type	Fair Value June 30, 2016	Percent of all Fixed Income Assets	Weighted Average Effective Duration (Years)	Interest Rate Risk Requiring Further Disclosure
U.S. treasuries	\$4,322,165,199	66.4%	6.1	See below
Implicit U.S. government agencies	475,752,040	7.3	0.2	none
Collateralized mortgage obligations	36,823,710	0.6	0.1	none
Non-U.S. sovereign	48,499,083	0.7	5.1	none
Asset-backed securities	37,210	0.0	0.1	none
Corporate bonds	1,391,576	0.0	5.1	none
Bank deposits	550,000,000	8.5	0.0	none
Repurchase agreements	1,033,084,559	15.9	0.0	none
Pooled investments	40,430,731	0.6	0.0	none
	<u>\$6,508,184,108</u>	<u>100.0%</u>	<u>4.1</u>	

### Effective Duration Analysis of U.S. Treasuries

Maturity	Fair Value June 30, 2016	Average Effective Duration of the Security Type (Years)	Contribution to Effective Duration (Years)
Less than 1 year to maturity	\$ 350,302,472	0.2	0.0
1- to 10-year maturities	3,673,464,760	5.7	4.9
Long coupon treasuries	298,397,967	17.2	1.2
	<u>\$4,322,165,199</u>		<u>6.1</u>

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 secured loans 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 0.06% to 0.56% and had maturities of one day to 35 days. The yield earned by the counterparties on the reverse repo transactions ranged from 0.23% to 0.87% 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 falls below the loan balance. To minimize this risk, MOSERS requires the financial institution to send collateral with a fair value greater than the value of the loan and revalues the collateral on a daily basis. As of fiscal year end, MOSERS held approximately \$34.2 million of counterparty collateral in excess of the repo balance.

In reverse repo transactions, MOSERS may be subject to credit risk if the counterparty fails to return the securities and the value of the securities held as collateral rises 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 \$13.1 million of MOSERS collateral in excess of the reverse repo balance.

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

### Repurchase Agreements by Collateral Type

Collateral Type	Fair Value of Collateral June 30, 2016	Fair Value Including Accrued Interest of Repos June 30, 2016	Excess (Deficit) Collateral	Percent Over Collateralized
U.S. treasuries/U.S. agencies	\$ 824,232,291	\$ 808,070,637	\$16,161,654	
Common stock	243,017,848	225,000,000	18,017,848	
Accrued interest	0	13,922	(13,922)	
	<u>\$1,067,250,139</u>	<u>\$1,033,084,559</u>	<u>\$34,165,580</u>	3.3%

### Reverse Repurchase Agreements by Collateral Type

Collateral Type	Fair Value of Collateral June 30, 2016	Market Value Including Accrued Interest of Reverse Repos June 30, 2016	Excess (Deficit) Collateral	Percent Over Collateralized
U.S. treasuries	\$3,612,548,612	\$3,592,235,615	\$20,312,997	
Receivables	2,054,332	0	2,054,332	
Accrued interest	0	9,225,982	(9,225,982)	
	<u>\$3,614,602,944</u>	<u>\$3,601,461,597</u>	<u>\$13,141,347</u>	0.4%

### 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, 2016, is highlighted in the table below.

### Currency Exposures by Asset Class

Currency	Cash & Cash Equivalents	Equities	Fixed Income	Alternatives	Total
Argentine Peso	\$ 24	\$ 1			\$ 25
Australian Dollar	355,661	92,982	\$ 179,165		627,808
Brazilian Real	131,591	11,018,478	7,793,703		18,943,772
British Pound Sterling	(871,805)	136,683,035	662,692		136,473,922
Canadian Dollar	(93,981)	35,161	331,046		272,226
Chilean Peso	36,228	1,612,976	43,790		1,692,994
Colombian Peso	12,898	583,927	3,905,820		4,502,645
Czech Koruna	10,149	305,297			315,446
Danish Krone		10,531,097			10,531,097
Egyptian Pound	3,692	254,023			257,715
Euro	(2,079,011)	141,698,073	(3,647,460)	\$58,980,158	194,951,760
Hong Kong Dollar	(400,360)	99,780,767			99,380,407
Hungarian Forint	11,475	456,849			468,324
Indian Rupee	219,150	13,785,937			14,005,087
Indonesian Rupiah	76,758	4,992,782	5,385,812		10,455,352
Israeli Shekel		13			13
Japanese Yen	1,967,970	197,398,451	298,860		199,665,281
Malaysian Ringgit	82,470	10,023,858	4,244,504		14,350,832
Mexican Peso	158,710	8,587,999	5,190,004		13,936,713
Moroccan Dirham	371				371
Norwegian Krone		5,391,160			5,391,160
Peruvian Nuevo Sol	3				3
Philippine Peso	28,944	2,642,263			2,671,207
Polish Zloty	2,143	1,902,233	5,826,979		7,731,355
Qatari Riyal	1	1,497,933			1,497,934
Romanian New Leu			638,235		638,235
Russian Ruble		537,370	3,254,070		3,791,440
Singapore Dollar		29,059,958			29,059,958
South African Rand	(82,567)	12,131,545	5,809,858		17,858,836
South Korean Won	(1,595,970)	35,339,330	1,169,914		34,913,274
Swedish Krona		7,953,842			7,953,842
Swiss Franc		80,397,457			80,397,457
Taiwan New Dollar	180,768	32,751,061			32,931,829
Thai Baht	16,547	28,070,267	2,032,167		30,118,981
Turkish Lira	66,255	10,504,465	4,735,711		15,306,431
United Arab Emirates Dirham	22,083	1,340,046			1,362,129
Venezuelan Boliviar	368				368
	\$(1,739,435)	\$887,360,636	\$47,854,870	\$58,980,158	\$992,456,229

**Derivatives**

Derivative instruments are financial contracts whose values depend on the values of one or more underlying assets, reference rates, or financial indexes. They include futures contracts, swap contracts, options contracts, and forward foreign currency exchange. The following tables summarize the various contracts in the portfolio as of June 30, 2016.

**Futures Contracts**

Futures Contract	Expiration Date	Long (Short)	Notional Value	Exposure
Currency futures	September 2016	Long	\$ 43,875,055	\$ (7,560)
Fixed income futures	September 2016	Long	1,657,001,186	(7,762,711)
Equity index futures	July 2016	(Short)	(3,922,629)	(86,387)
Equity index futures	September 2016	Long	61,023,909	415,346
Commodity futures	August 2016	Long	180,079,780	(4,912,980)
Commodity futures	September 2016	Long	108,973,758	(3,744,808)
Commodity futures	October 2016	Long	7,876,068	(205,066)
Commodity futures	November 2016	Long	2,825,463	99,838
Commodity futures	December 2016	Long	5,394,528	(136,248)
Commodity futures	January 2017	Long	2,549,316	(62,462)
Commodity futures	February 2017	Long	3,393,104	(82,580)
Commodity futures	March 2017	Long	5,398,957	(128,801)
Commodity futures	April 2017	(Short)	(15,808,304)	363,061
Total			\$2,058,660,191	\$(16,251,358)

**Foreign Currency Forward Contracts at June 30, 2016**

Currency	Net Notional Long (Short)	Exposure
Brazilian Real	\$ (1,976,267)	\$(218,476)
Colombian Peso	281,184	4,386
Euro	(40,840,707)	637,669
Hungarian Forint	468,938	(18,542)
Indonesian Rupiah	(580,570)	(3,618)
Mexican Peso	(92,947)	(8,803)
Malaysian Ringgit	622,241	6,854
Peruvian Nuevo Sol	887,395	11,269
Polish Zloty	(965,702)	(6,802)
Romanian Leu	1,228,507	(32,997)
Russian Ruble	(539,878)	(24,701)
South African Rand	(1,332,912)	(48,153)
Thai Baht	357,019	(3,556)
Turkish Lira	(883,766)	(11,378)
U.S. Dollar	43,650,617	0
Foreign currency forward contract asset	\$ 283,152	\$ 283,152

**Swap Contracts**

Counterparty Credit Rating	Notional Value	Exposure
<b>Total return swaps - equity</b>		
A	\$ 124,698,370	\$4,256,043
BBB+	(18,173,588)	1,508,248
Total	\$ 106,524,782	\$5,764,291
<b>Total return swaps - fixed income</b>		
A	\$1,094,529,923	\$7,290,626
Total	\$1,094,529,923	\$7,290,626
<b>Total return swaps - commodities</b>		
A+	\$ 770,011,625	\$9,249,140
A-	105,208,859	53,108
Total	\$ 875,220,484	\$9,302,248

**Options Contracts**

	Expiration	Notional Value	Exposure
Written commodity call option	July 2016	\$(194,416,500)	\$(10,870,600)
Purchased commodity put option	July 2016	161,804,700	212,395
Total		\$ (32,611,800)	\$(10,658,205)

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, options, 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, futures, and options 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, 2016, the change in fair value in the swap contracts resulted in a loss of \$122.3 million of investment income. The change in fair value in the futures contracts resulted in \$144.5 million of investment income. The change in fair value in the options contracts resulted in a loss of \$10.6 million of investment income and the change in fair value of the foreign exchange contracts resulted in \$0.2 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, 2016, MOSERS had contracts with over 98 limited partnerships across various types of alternative investments which collectively represent 52% of the total fund. A *Schedule of Limited Partnerships* follows on pages 45-46.

### 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 fair value for domestic loans and 105% of fair value for international loans. MOSERS does not have the authority to pledge or sell collateral securities without borrower default. Securities on loan at fiscal year end for cash collateral and on loan for noncash collateral are presented in the schedule on page 47. On June 30, 2016, MOSERS had no credit risk exposure to borrowers because the collateral amounts received exceeded amounts out on loan.

As of June 30, 2016, 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, the majority of loans are open 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, 2016, the cash collateral account had a fair value of \$14,258,587 and a weighted average maturity of one day. For all of the securities lending operational services, the custodian is paid an annual fee, which is netted against MOSERS' earnings in the securities lending programs managed by Deutsche Bank.

## Schedule of Limited Partnerships

Partnership Name	Style	Investments at Fair Value as of June 30, 2016
Actis Emerging Markets III	Emerging markets	\$ 18,293,330
Actis Global IV	Emerging markets	22,910,735
African Development Partners I, LLC	Emerging markets	24,708,209
African Development Partners II, LLC	Emerging markets	8,630,634
Alinda Infrastructure Fund I, LP	Infrastructure	27,244,000
American Industrial Partners Capital Fund V, LP	Corporate buyout	36,380,982
American Industrial Partners Capital Fund VI, LP	Corporate buyout	1,060,580
AQR DELTA Sapphire Fund, LP	Muti-strategy	332,367,824
AQR Global Risk Premium Fund IV, LP	Beta-balanced	404,066,465
AQR Style Premia Fund, LP	Muti-strategy	57,709,964
Axiom Asia Private Capital Fund II, LP	Emerging markets	39,685,064
Axiom Asia Private Capital Fund III, LP	Emerging markets	36,209,237
Axxon Brazil Private Equity Fund II B, LP	Emerging markets	16,347,160
Bayview Opportunity Domestic III b, LP	Distressed real estate debt	50,803,928
Bayview Opportunity Domestic, LP	Distressed real estate debt	8,114,728
Blackstone Real Estate Partners IV	Active real estate	22,968,733
Blackstone Real Estate Partners V	Active real estate	53,455,962
Blackstone Real Estate Partners VI	Active real estate	43,204,033
Blackstone Real Estate Partners VII	Active real estate	70,957,651
Blackstone Topaz Fund, LP	Multi-strategy – fund-of-funds	348,119,832
Blakeney Onyx, LP	Emerging markets	51,220,393
Bridgepoint Europe III A, LP	Corporate buyout	14,517,857
Bridgepoint Europe IV B, LP	Corporate buyout	19,060,837
Bridgewater Associates – All Weather, LLC	Beta-balanced	483,712,947
Bridgewater Associates – Diamond Ridge Fund, LLC	Global macro	85,456,582
Campbell Timber Fund II A, LP	Timberland	988,067
CarVal Investors CVI Global Value Fund A, LP – private debt	Distressed real estate debt	10,200,000
CarVal Investors CVI Global Value Fund A, LP – real estate	Distressed real estate debt	10,200,000
Castlelake Aviation II, LP	Special situations	17,171,363
Catalyst Fund Limited Partnership III	Canadian distressed debt	59,501,213
Catalyst Fund Limited Partnership IV	Canadian distressed debt	24,387,763
Catalyst Fund Limited Partnership V	Canadian distressed debt	15,620,193
Catterton Partners V, LP	Corporate buyout	16,253,905
Catterton Partners VI, LP	Corporate buyout	22,331,129
Catterton Partners VII, LP	Corporate buyout	27,634,017
Cornwall Domestic, LP	Multi-strategy	70,233,163
Davidson Kempner Institutional Partners, LP	Event driven	26,355,338
DDJ Capital Management – B IV Capital Partners, LP	Distressed debt	29,089
DRI Capital – LSRC	Intellectual property	16,467,833
DRI Capital – LSRC II	Intellectual property	225,008
EIG Energy Co-investment I	Energy (infrastructure)	5,381,648
EIG Energy Fund XIV, LP	Energy (mezzanine)	5,298,075
EIG Energy Fund XV, LP	Energy (mezzanine)	32,526,090
EIG Energy Fund XVI, LP	Energy (mezzanine)	12,383,528
Elliott International, Ltd.	Multi-strategy	142,229,000
Eton Park Fund, LP	Multi-strategy	866,874
Farallon Capital Institutional Partners, LP	Multi-strategy	3,370,000
Gaoling Fund, LP	Long/short equity	97,979,140
Garnet Sky Investors Company, Ltd.	Timberland	116,132,316
Gateway Energy & Resource Holdings, LLC	Energy (diversified)	23,479,242

Schedule of Limited Partnerships continued on page 46

*Schedule of Limited Partnerships continued from page 45*

Partnership Name	Style	Investments at Fair Value as of June 30, 2016
GCM Equity Partners, LP	Long/short equity	46,939,367
Glenview Capital Opportunity Fund, LP	Long/short equity	23,397,247
Global Forest Partners GTI7 Institutional Investors Company, Ltd.	Timberland	78,373,241
HBK Merger Strategies Offshore Fund, Ltd.	Merger arbitrage	52,905,567
JLL Partners Fund V, LP	Corporate buyout	13,269,317
JLL Partners Fund VI, LP	Corporate buyout	58,583,751
King Street Capital, LP	Credit driven	4,568,997
King Street Capital, Ltd.	Credit driven	463,886
Linden Capital Partners Co-investment, LP	Corporate buyout	10,588,235
Linden Capital Partners II, LP	Corporate buyout	33,799,706
Mast Credit Opportunities I, LP	Credit driven	49,671,221
Merit Energy Partners F-II, LP	Energy (oil & gas)	8,083,711
MHR Institutional Partners II A, LP	Distressed debt	28,461,085
MHR Institutional Partners III, LP	Distressed debt	30,191,084
MHR Institutional Partners IV, LP	Distressed debt	6,934,939
Millennium Technology Value Partners Co-investment	Direct secondaries	3,552,566
Millennium Technology Value Partners II, LP	Direct secondaries	14,675,981
Moon Capital Global Equity Offshore Fund, Ltd.	Long/short equity	820,251
New Mountain Partners III, LP	Corporate buyout	39,957,258
Newport Pioneer, LLC	Multi-strategy – fund-of-funds	1,209,487
Oaktree European Credit Opportunities Fund, LP	European loans	693,254
OCM/GFI Power Opportunities Fund II, LP	Corporate buyout	214,064
OCM Opportunities Fund IV b, LP	Distressed debt	339,601
OCM Opportunities Fund VII b, LP	Distressed debt	9,036,465
OCM Opportunities Fund VIII b, LP	Distressed debt	18,668,343
OCM Power Opportunities Fund III, LP	Corporate buyout	11,847,588
OCM Real Estate Opportunities Fund III, LP	Active real estate	2,007,811
Perry Partners, LP	Multi-strategy	42,042
Pharo Macro Fund, Ltd.	Global macro	107,174,309
Resource Management Service – Wildwood Timberlands, LLC	Timberland	73,982,899
Silver Creek Special Opportunities Fund I, LP	Special situations – fund-of-funds	10,762,022
Silver Creek Special Opportunities Fund II, LP	Special situations – fund-of-funds	16,920,825
Silver Lake Partners II, LP	Corporate buyout	6,086,464
Silver Point Capital Fund, LP	Credit driven	12,888
Siris II Co-investment I	Corporate buyout	3,198,821
Siris II Co-investment II	Corporate buyout	6,900,000
Siris Partners II, LP	Corporate buyout	16,811,390
Siris Partners III, LP	Corporate buyout	4,158,581
Standard Investment Research Hedged Equity Fund, LP	Equity market neutral	93,088,991
StepStone Capital Buyout Fund I, LP	Corporate buyout – fund-of-funds	6,543,365
StepStone Capital Buyout Fund II, LP	Corporate buyout – fund-of-funds	18,244,128
StepStone Opportunities Fund II, LP	Private equity co-investment	1,234,660
The Veritas Capital Fund III, LP	Corporate buyout	25,131,140
The Veritas Capital Fund IV, LP	Corporate buyout	43,974,372
TPG-Axon Partners (Offshore), Ltd.	Long/short equity	1,218,105
Viking Global Equities III, Ltd.	Long/short equity	155,547,959
Visium Balanced Fund, LP	Long/short equity	92,131,486
Wellington Management – Spindrift Investors (Bermuda)	Long/short equity	538,042
Other Miscellaneous	Miscellaneous	11,431
		<u>\$4,267,419,604</u>

## Summary of Fair Value of Investments as of June 30, 2016

	Pension Trust Funds		Internal Service Funds	
	Investments at Cost Value	Investments at Fair Value	Investments at Cost Value	Investments at Fair Value
<b>Common stocks</b>				
Out on loan	\$ 12,604,827	\$ 14,601,839		
Not on securities loan	284,713,143	272,299,932		
Total	297,317,970	286,901,771		
International equities	175,328,927	789,143,593		
Treasury bonds, notes and bills	3,920,547,677	3,958,718,113		
Corporate bonds	908,539	148,810		
Convertible bonds	911,071	968,785		
Government bonds	55,807,535	47,606,027		
Limited partnerships	3,004,385,263	4,267,419,604		
REITs	3,617	10,646		
Options	(83,620)	(10,658,205)		
Foreign currencies	7,602,952	7,821,688		
International corporate bonds	1,528,964	1,263,124		
Repurchase agreements	9,668,216	9,668,216	\$3,935,042	\$3,935,042
Short-term investment funds	2,468,694,173	2,468,694,173		
<b>Total investments</b>				
Out on loan	12,604,827	14,601,839		
Not on securities loan	9,930,016,457	11,813,104,506	3,935,042	3,935,042
Total	\$9,942,621,284	\$11,827,706,345	\$3,935,042	\$3,935,042
<b>Reconciliation to investments on Statement of Fiduciary Net Position</b>				
Total from above		\$11,827,706,345		
Less short-term investments:				
Repurchase agreements		(9,668,216)		
Short-term investment funds		(2,454,472,796)		
Less invested securities lending collateral:				
Short-term investment funds		(14,221,377)		
Corporate bonds		(37,210)		
<b>Investments on Statement of Fiduciary Net Position</b>		<u>\$ 9,349,306,746</u>		

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 as of June 30, 2015, and June 30, 2016, and changes to those account balances during the year ended June 30, 2016.

***Pension Trust Funds*****Capital Asset Account**

	Land	Building and Building Improvements	Furniture Fixtures and Equipment	Software and Licensing	Total Capital Assets
<b>Capital assets</b>					
Balances June 30, 2015	\$267,286	\$4,662,873	\$1,349,120	\$277,261	\$6,556,540
Additions	0	1,965	167,434	66,801	236,200
Transfers	0	(380,501)	0	380,501	0
Deletions	0	0	(230,918)	0	(230,918)
Balances June 30, 2016	267,286	4,284,337	1,285,636	724,563	6,561,822
<b>Accumulated depreciation</b>					
Balances June 30, 2015	0	1,572,730	1,131,009	151,010	2,854,749
Depreciation expense	0	148,140	109,262	126,512	383,914
Deletions	0	0	(218,742)	0	(218,742)
Balances June 30, 2016	0	1,720,870	1,021,529	277,522	3,019,921
Net capital assets June 30, 2016	\$267,286	\$2,563,467	\$ 264,107	\$447,041	\$3,541,901

***Internal Service Funds*****Capital Asset Account**

	Leasehold Improvements	Furniture Fixtures and Equipment	Software and Licensing	Total Capital Assets
<b>Capital assets</b>				
Balances June 30, 2015	\$3,880	\$6,319	\$4,950	\$15,149
Additions	0	1,197	0	1,197
Balances June 30, 2016	3,880	7,516	4,950	16,346
<b>Accumulated depreciation</b>				
Balances June 30, 2015	970	4,444	2,388	7,802
Depreciation expense	970	698	990	2,658
Balances June 30, 2016	1,940	5,142	3,378	10,460
Net capital assets June 30, 2016	\$1,940	\$2,374	\$1,572	\$ 5,886

### (5) Employers' Net Pension Liability

The components of the net pension liability as of June 30, 2016, are shown in the *Schedule of Employers' Net Pension Liability* below.

#### Schedule of Employers' Net Pension Liability

	MSEP	Judicial Plan
Total pension liability	\$12,751,162,753	\$547,621,617
Less: MOSERS fiduciary net position	8,109,161,214	132,056,351
Employers' net pension liability	\$ 4,642,001,539	\$415,565,266
Plan net position as a percentage of the total pension liability	63.60%	24.11%
Covered employee payroll	\$ 1,921,528,936	\$ 57,421,016
Employers' net pension liability as a percentage of employee covered payroll	241.58%	723.72%

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. An experience study covering the five-year period ended June 30, 2015 was performed in 2016. 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 52. The total pension liability as of June 30, 2016, is \$12,751,162,753 for MSEP and \$547,621,617 for the Judicial Plan based on an actuarial valuation performed as of June 30, 2016, and a measurement date of June 30, 2016 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

	MSEP	Judicial Plan
Valuation date	June 30, 2016	June 30, 2016
Actuarial cost method	Entry age normal	Entry age normal
Amortization method	Level percent	Level percent
Remaining amortization period	28 years closed	28 years closed
Asset valuation method	5-year rolling smoothed	5-year rolling smoothed
Investment rate of return	+25/-20% market corridor	+25/-20% market corridor
Projected salary increases	3.25-8.75%	3.0-5.2%
Rate of payroll growth	3.00%	3.00%
COLAs	4.00%*	4.00%*
Price inflation	2.50%	2.50%
Remaining amortization period	28 years	28 years

\* 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, price inflation is assumed to be 2.50% and the annual COLA is assumed to be 2.00% (80% of 2.50%), on a compounded basis.

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%. The pre-retirement 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.

The discount rate used to measure the total pension liability was 7.65%. 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 7.65% 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 state of Missouri as of June 30, 2016, calculated using the discount rate of 7.65%, as well as what the net pension liability would be if it were calculated using a discount rate that is 1.0% lower (6.65%) or 1.0% higher (8.65%) than the current rate.

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

Employers' net pension liability	1% Decrease (6.65%)	Current Discount Rate (7.65%)	1% Increase (8.65%)
MSEP	\$6,112,408,312	\$4,642,001,539	\$3,409,192,306
Judicial Plan	471,242,206	415,565,266	367,891,602

The funding status of the plans and *Employer Schedule of Funding Progress* can be found in the *Actuarial Section* on page 100.

#### (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 are obligated by state law to 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%. The unfunded accrued liabilities are amortized over a closed 28-year period as of June 30, 2016. MSEP 2011 employees 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 retirement benefits 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, 2016, 25,226 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, 2016, was \$1,872,742. 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, 2016, 214 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 (\$27,206 for the year ended June 30, 2016). 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 32,915 members covered under the program as of June 30, 2016. This insured defined benefit coverage is financed 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, 2016, was \$7,959,584. 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](http://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 \$257,003 in FY14, \$267,315 in FY15, and \$260,223 in FY16 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, 2016, MOSERS has \$457,681,747 and €868,751 unfunded commitments in the illiquids asset class.

### ***(10) Contingencies***

There were no contingencies which would have a material impact on the financial statements at June 30, 2016.

### ***(11) Risk Management***

MOSERS is exposed to various risks of loss related to natural disasters, errors, 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.



## REQUIRED SUPPLEMENTARY INFORMATION

*Pension Trust Funds***Schedule of Changes in****Employers' Net Pension Liability | For Years Ended June 30, 2014, 2015, and 2016\*****MSEP**

	2014	2015	2016
<b>Total pension liability</b>			
Service cost	\$ 158,116,026	\$ 150,412,577	\$ 149,021,755
Interest on the total pension liability	869,878,195	896,451,618	913,877,923
Difference between expected and actual experience	12,376,237	(27,983,267)	61,150,083
Assumption changes	0	(57,568,553)	656,805,085
Benefit payments	(679,014,251)	(725,786,536)	(753,512,304)
Refunds	(1,421,856)	(2,479,264)	(3,798,199)
<b>Net change in total pension liability</b>	<b>359,934,351</b>	<b>233,046,575</b>	<b>1,023,544,343</b>
<b>Total pension liability - beginning</b>	<b>11,134,637,484</b>	<b>11,494,571,835</b>	<b>11,727,618,410</b>
<b>Total pension liability - ending (a)</b>	<b>\$11,494,571,835</b>	<b>\$11,727,618,410</b>	<b>\$12,751,162,753</b>
<b>Plan fiduciary net position</b>			
Employer contributions	\$ 326,370,336	\$ 329,752,832	\$ 329,957,369
Employee contributions	14,025,328	18,099,455	21,684,920
Pension plan net investment income (loss)	1,485,159,992	(237,070,529)	1,740,269
Benefit payments	(679,014,251)	(725,786,536)	(753,512,304)
Refunds	(1,421,856)	(2,479,264)	(3,798,199)
Pension plan administrative expense	(7,336,922)	(8,077,692)	(8,489,375)
Other	5,161,629	5,434,820	4,923,622
<b>Net change in plan fiduciary net position</b>	<b>1,142,944,256</b>	<b>(620,126,914)</b>	<b>(407,493,698)</b>
<b>Plan fiduciary net position - beginning</b>	<b>7,993,837,570</b>	<b>9,136,781,826</b>	<b>8,516,654,912</b>
<b>Plan fiduciary net position - ending (b)</b>	<b>9,136,781,826</b>	<b>8,516,654,912</b>	<b>8,109,161,214</b>
<b>Net pension liability - ending (a)-(b)</b>	<b>\$ 2,357,790,009</b>	<b>\$ 3,210,963,498</b>	<b>\$ 4,642,001,539</b>
<b>Plan fiduciary net position as a percentage of total pension liability</b>	<b>79.49%</b>	<b>72.62%</b>	<b>63.60%</b>
<b>Covered employee payroll</b>	<b>\$ 1,902,719,928</b>	<b>\$ 1,918,527,768</b>	<b>\$ 1,921,528,936</b>
<b>Net pension liability as a percentage of covered employee payroll</b>	<b>123.92%</b>	<b>167.37%</b>	<b>241.58%</b>

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

## REQUIRED SUPPLEMENTARY INFORMATION

*Pension Trust Funds***Schedule of Changes****in Employers' Net Pension Liability | For Years Ended June 30, 2014, 2015, and 2016\*****Judicial Plan**

	2014	2015	2016
<b>Total pension liability</b>			
Service cost	\$ 8,990,293	\$ 10,613,686	\$ 10,932,097
Interest on the total pension liability	34,013,615	36,161,612	37,755,240
Difference between expected and actual experience	13,360,614	5,103,664	(5,036,696)
Assumption changes	0	0	53,991,379
Benefit payments	(29,406,625)	(31,245,906)	(32,979,706)
Refunds	0	0	(10,008)
<b>Net change in total pension liability</b>	<b>26,957,897</b>	<b>20,633,056</b>	<b>64,652,306</b>
<b>Total pension liability - beginning</b>	<b>435,378,358</b>	<b>462,336,255</b>	<b>482,969,311</b>
<b>Total pension liability - ending (a)</b>	<b>\$462,336,255</b>	<b>\$482,969,311</b>	<b>\$547,621,617</b>
<b>Plan fiduciary net position</b>			
Employer contributions	\$ 29,264,877	\$ 32,696,686	\$ 33,642,498
Employee contributions	294,810	488,193	661,206
Pension plan net investment income (loss)	17,199,701	(3,610,352)	28,081
Benefit payments	(29,406,625)	(31,245,906)	(32,979,706)
Refunds	0	0	(10,008)
Pension plan administrative expense	(105,693)	(123,015)	(136,983)
Other	4,195,049	0	0
<b>Net change in plan fiduciary net position</b>	<b>21,442,119</b>	<b>(1,794,394)</b>	<b>1,205,088</b>
<b>Plan fiduciary net position - beginning</b>	<b>111,203,538</b>	<b>132,645,657</b>	<b>130,851,263</b>
<b>Plan fiduciary net position - ending (b)</b>	<b>132,645,657</b>	<b>130,851,263</b>	<b>132,056,351</b>
<b>Net pension liability - ending (a)-(b)</b>	<b>\$329,690,598</b>	<b>\$352,118,048</b>	<b>\$415,565,266</b>
<b>Plan fiduciary net position as a percentage of total pension liability</b>	<b>28.69%</b>	<b>27.09%</b>	<b>24.11%</b>
<b>Covered employee payroll</b>	<b>\$ 49,587,936</b>	<b>\$ 55,656,457</b>	<b>\$ 57,421,016</b>
<b>Net pension liability as a percentage of covered employee payroll</b>	<b>664.86%</b>	<b>632.66%</b>	<b>723.72%</b>

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

## REQUIRED SUPPLEMENTARY INFORMATION

## Pension Trust Funds

## Schedule of Employer Contributions | Last Ten Years

## MSEP

Year Ended June 30	Actuarially Determined Contribution	Contributions in Relation to the Actuarially Determined Contribution**	Contribution Deficiency (Excess)	Covered Employee Payroll	Contributions as a Percentage of Covered Payroll*
2007	\$239,488,751	\$239,488,751	\$0	\$1,846,643,330	13.0%
2008	249,770,156	249,770,156	0	1,916,527,398	13.0
2009	252,105,008	252,105,008	0	2,002,402,087	12.6
2010	251,226,187	251,226,187	0	1,945,095,321	12.9
2011	263,418,048	263,418,048	0	1,875,569,816	14.0
2012	263,373,924	263,373,924	0	1,864,069,493	14.1
2013	274,655,284	274,655,284	0	1,880,212,950	14.6
2014	326,370,336	326,370,336	0	1,902,719,928	17.2
2015	329,752,832	329,752,832	0	1,918,527,768	17.2
2016	329,957,369	329,957,369	0	1,921,528,936	17.2

## Judicial Plan

Year Ended June 30	Actuarially Determined Contribution	Contributions in Relation to the Actuarially Determined Contribution**	Contribution Deficiency (Excess)	Covered Employee Payroll	Contributions as a Percentage of Covered Payroll*
2007	\$23,745,467	\$23,745,467	\$0	\$40,846,581	58.1%
2008	26,215,309	26,215,309	0	44,542,530	58.9
2009	27,725,882	27,725,882	0	45,505,512	60.9
2010	27,029,198	27,029,198	0	46,112,730	58.6
2011	27,702,682	27,702,682	0	45,888,020	60.4
2012	26,324,526	26,324,526	0	45,835,501	57.4
2013	28,330,649	28,330,649	0	48,697,726	58.2
2014	29,264,877	29,264,877	0	49,587,936	59.0
2015	32,696,686	32,696,686	0	55,656,457	58.7
2016	33,642,498	33,642,498	0	57,421,016	58.6

\* 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.

## REQUIRED SUPPLEMENTARY INFORMATION

*Pension Trust Funds***Schedule of Annual Money-Weighted Rate of Return on Investments\***

Year Ended June 30	Annual Money-Weighted Rate of Return — Net of Investment Expense
2014	19.25%
2015	(2.60)
2016	0.08

\* Schedule is intended to show information for 10 years. Additional years will be displayed as they become 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, 2016**

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 28-year amortization period was used for the June 30, 2016 valuations. 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 8.0% as of June 30, 2015, to 7.65% per year as of June 30, 2016, 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 (COLA) is 4.0% (on a compound basis) when a minimum COLA is in effect. When no minimum COLA is in effect, price inflation is assumed to be 2.5% and the annual COLA is assumed to be 2.0% (80% of 2.5%), on a compound basis.

**2007**

The actuarial valuations as of June 30, 2007, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2009.

	Amount	Percent of Payroll
<b>MSEP</b>		
Change in benefit assumptions or methods	\$ (369,329)	(0.02)%
Experience and nonrecurring items	(5,355,266)	(0.29)
<b>Judicial Plan</b>		
Change in benefit assumptions or methods	(273,672)	(0.67)
Experience and nonrecurring items	853,694	2.09

**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.

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

**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.

	Amount	Percent of Payroll
<b>MSEP</b>		
State of Missouri general pay freeze	\$ (4,405,285)	(0.22)%
Experience and nonrecurring items	55,466,538	2.77
Change in valuation asset corridor from +/- 20% to +/- 30%	(29,835,791)	(1.49)
<b>Judicial Plan</b>		
State of Missouri general pay freeze	350,392	0.77
Experience and nonrecurring items	496,010	1.09
Change in valuation asset corridor from +/- 20% to +/- 30%	(141,067)	(0.31)



## REQUIRED SUPPLEMENTARY INFORMATION

**2010**

The actuarial valuations as of June 30, 2010, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2012.

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

**2011**

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

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

**2012**

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

	Amount	Percent of Payroll
<b>MSEP</b>		
Change in assumptions or methods	\$21,623,206	1.16%
Experience and nonrecurring items	25,537,752	1.37
<b>Judicial Plan</b>		
Change in assumptions or methods	948,795	2.07
Experience and nonrecurring items	320,849	0.70

**2013**

The actuarial valuations as of June 30, 2013, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2015.

	Amount	Percent of Payroll
<b>MSEP</b>		
Change in benefit assumptions or methods	\$18,990,151	1.01%
Experience and nonrecurring items	(376,043)	(0.02)
<b>Judicial Plan</b>		
Change in benefit assumptions or methods	(603,852)	(1.24)

## REQUIRED SUPPLEMENTARY INFORMATION

**2014**

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

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

**2015**

The actuarial valuations as of June 30, 2015 reflected the following changes to the computed actuarial determined contribution (ADC) rates for fiscal year ending 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.

	Amount	Percent of Payroll
<b>MSEP</b>		
Recognition of asset losses	\$ 7,674,111	0.40%
Experience and nonrecurring items	4,412,614	0.23
Change in normal cost due to increased participants in MSEP 2011 and experience	(4,604,467)	(0.24)
Liability (gain) loss	(1,918,528)	(0.10)
Change in benefit assumptions or methods	3,069,644	0.16
Minimum funding policy contribution	(1,151,117)	(0.06)
<b>Judicial Plan</b>		
Recognition of asset losses	116,879	0.21
Experience and nonrecurring items	417,423	0.75
Change in normal cost due to increased participants in Judicial Plan 2011 and experience	(372,898)	(0.67)
Liability (gain) loss	361,767	0.65
Minimum funding policy contribution	(122,444)	(0.22)

**2016**

The actuarial valuations as of June 30, 2016 reflected the following changes to the computed actuarial determined contribution (ADC) rates for fiscal year ending June 30, 2018.

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

## ADDITIONAL FINANCIAL INFORMATION

## Pension Trust Funds

## Schedules of Investment Expenses

Investing Activity	MSEP	Judicial Plan	Total
<b>Investment management and administrative fees</b>			
Actis Emerging Markets III & IV – private equity	\$1,446,657	\$ 23,343	\$1,470,000
Aeolus Property Catastrophe, LP – hedge funds	21,058	340	21,398
African Development Partners I & II, LLC – private equity	174,785	2,820	177,605
Alinda Infrastructure Fund I, LP – private equity	419,557	6,770	426,327
American Industrial Partners IV & V – private equity	1,634,236	26,370	1,660,606
AQR Absolute Return Institutional Fund, LP – hedge funds	3,245,833	52,374	3,298,207
AQR DELTA Sapphire Fund, LP – hedge funds	4,277,049	69,014	4,346,063
AQR Global Risk Premium Fund IV, LP – beta-balanced	2,390,779	38,577	2,429,356
AQR Style Premia Fund, LP – beta-balanced	1,104,530	17,823	1,122,353
Axiom Asia Private Capital Fund II & III, LP – private equity	1,553,195	25,062	1,578,257
Axxon Brazil Private Equity Fund II – private equity	985,168	15,897	1,001,065
Bayview Opportunity Domestic, LP – high yield	428,780	6,919	435,699
Bayview Opportunity Domestic III, LP – real estate	1,769,911	28,559	1,798,470
BlackRock Financial Management Bank Loans – high yield	1,509	24	1,533
Blackstone Real Estate Partners IV, V, VI, & VII – real estate	1,275,817	20,586	1,296,403
Blackstone Topaz Fund, LP – hedge funds	4,605,122	74,307	4,679,429
Blakeney Onyx, LP – emerging markets	1,586,007	25,592	1,611,599
Brevan Howard, LP – hedge funds	1,489,300	24,031	1,513,331
Bridgepoint Europe III A & IV B, LP – private equity	377,333	6,089	383,422
Bridgewater Associates – All Weather, LLC – beta-balanced	2,020,757	32,607	2,053,364
Bridgewater Associates Diamond Ridge Fund, LLC – hedge funds	3,495,122	56,397	3,551,519
Campbell Timber Fund II A, LP – timber	479,975	7,745	487,720
CarVal Investors CVI Global Value Fund A, LP – real estate	54,524	880	55,404
CarVal Investors CVI Global Value Fund A, LP – private debt	54,524	880	55,404
Castlelake Aviation II – private equity	1,500,044	24,204	1,524,248
Catalyst Fund Limited Partnership III, IV & V – private debt	2,997,010	48,359	3,045,369
Catterton Partners V, VI, & VII, LP – private equity	1,970,428	31,794	2,002,222
Cornwall Domestic, LP – hedge funds	3,048,137	49,184	3,097,321
Davidson Kempner Institutional Partners, LP – hedge funds	967,450	15,611	983,061
DRI Capital LSRC & LSRC II – private equity	393,061	6,342	399,403
EIG Energy Fund XIV, LP – real estate	931,619	15,032	946,651
EIG Energy Fund XV, LP – private equity	(1,577,365)	(25,452)	(1,602,817)
Elliott International, Ltd. – hedge funds	3,667,814	59,183	3,726,997
Empyrean Capital Fund, LP – hedge funds	(65,475)	(1,057)	(66,532)
Farallon Capital Institutional Partners, LP – hedge funds	(153,893)	(2,483)	(156,376)
Gaoling Fund, LP – hedge funds	232,169	3,746	235,915
Garnet Sky Investors Company, Ltd. – timber	(1,266,166)	(20,431)	(1,286,597)
Gateway Energy & Resource Holdings, LLC – real estate	288,057	4,648	292,705
GCM Equity Partners, LP – hedge funds	10,257	166	10,423
Glenview Institutional Partners & Glenview Capital Opportunity Fund, LP – hedge funds	(1,721,704)	(27,781)	(1,749,485)
Global Forest Partners GTI7 Institutional Investors Company, Ltd. – timber	742,742	11,985	754,727
Harvest Fund Advisors – real estate	908,438	14,658	923,096
HBK Merger Strategies Offshore Fund, Ltd. – hedge funds	1,469,342	23,709	1,493,051
HBK Offshore Fund, Ltd. – hedge funds	189,479	3,057	192,536
JLL Partners V & VI, LP – private equity	1,255,509	20,259	1,275,768
King Street Capital, LP – hedge funds	341,260	5,507	346,767
Linden Capital Partners II, LP – private equity	664,931	10,729	675,660
Mast Credit Opportunities I, LP – hedge funds	424,850	6,855	431,705
Merit Energy Partners F-II, LP – real estate	247,033	3,986	251,019
MHR Institutional Partners IIA, III & IV, LP – private debt	(9,287,951)	(149,869)	(9,437,820)

Schedule of Investment Expenses continued on page 60

## ADDITIONAL FINANCIAL INFORMATION

Schedule of Investment Expenses continued from page 59

Investing Activity	MSEP	Judicial Plan	Total
Millennium Technology Partners II, LP – private equity	226,557	3,656	230,213
New Mountain Partners III, LP – private equity	3,838,597	61,939	3,900,536
NISA Investment Advisors, LLC – beta-balanced	4,612,310	74,423	4,686,733
OCM/GFI Power Opportunities Fund II & III, LP – private equity	677,630	10,934	688,564
OCM Opportunities Fund IV b, VII b & VIII b, LP – private debt	69,989	1,129	71,118
OCM Real Estate Opportunities Fund III, LP – real estate	(358,220)	(5,780)	(364,000)
Perry Capital – hedge funds	516	8	524
Pharo Macro Fund, Ltd. – hedge funds	3,078,210	49,669	3,127,879
Resource Management Service - Wildwood Timberlands, LLC – timber	394,299	6,362	400,661
Silchester International Investors – int'l developed equity	4,111,080	66,336	4,177,416
Silver Lake Partners II, LP – private equity	497,235	8,023	505,258
SIR Hedged Equity Fund, Ltd. – hedge funds	3,672,928	59,266	3,732,194
Siris Partners II, LP – private equity	606,155	9,781	615,936
Siris Partners III, LP – private equity	668,911	10,793	679,704
State Street Global Advisors – emerging markets	189,526	3,058	192,584
StepStone Capital Buyout Fund I & II, LP – private equity	106,847	1,724	108,571
StepStone Opportunities Fund II, LP – private equity	80,388	1,297	81,685
Stone Harbor Investment Partners, LP – emerging markets	275,147	4,440	279,587
TPG-Axon Partners (Offshore), Ltd. – hedge funds	(8,029)	(130)	(8,159)
Veritas Capital Fund III & IV, LP – private equity	2,319,698	37,430	2,357,128
Viking Global Equities III, Ltd. – domestic equity	2,500,270	40,344	2,540,614
Visium Balanced Fund, LP – hedge funds	2,112,715	34,093	2,146,808
Total investment management and administrative fees	72,741,363	1,173,742	73,915,105
<b>Other investment fees</b>			
Investment consultant fees			
Summit Strategies, Inc.	812,974	13,118	826,092
TimberLink Consulting	47,976	774	48,750
Investment custodial fees			
BNY Mellon	397,800	6,419	404,219
Performance and risk measurement fees			
BNY Mellon	178,557	2,881	181,438
MSCI	255,871	4,129	260,000
Internal investment activity expenses	3,366,920	54,328	3,421,248
Total investing activity expenses	77,801,461	1,255,391	79,056,852
<b>Securities lending activity</b>			
Securities lending borrower rebates	(95,022)	(1,533)	(96,555)
Securities lending management fees			
BNY Mellon	123,015	1,985	125,000
Deutsche Bank	13,664	220	13,884
Total securities lending activity expenses	41,657	672	42,329
Total investment expenses	\$77,843,118	\$1,256,063	\$79,099,181

## ADDITIONAL FINANCIAL INFORMATION

*Pension Trust Funds***Schedules of Internal Investment Activity Expenses | Year Ended June 30, 2016**

	MSEP	Judicial Plan	Total
<b>Personnel services</b>			
Salaries	\$1,937,566	\$31,264	\$1,968,830
Fringe benefits	827,229	13,348	840,577
Total personnel services	2,764,795	44,612	2,809,407
<b>Professional services</b>			
Attorney services	67,029	1,082	68,111
Total professional services	67,029	1,082	68,111
<b>Communications</b>			
Telephone	16,314	263	16,577
Total communications	16,314	263	16,577
<b>Facilities</b>			
Utilities	2,592	42	2,634
Lease expense	45,710	738	46,448
Depreciation	35,850	578	36,428
Facility maintenance	7,599	123	7,722
Vehicle maintenance and operation	119	2	121
Total facilities	91,870	1,483	93,353
<b>Software and equipment</b>			
Computer supplies and software	5,726	92	5,818
Depreciation	9,630	155	9,785
Loss on sale of equipment	639	10	649
Total software and equipment	15,995	257	16,252
<b>Education, meetings and travel</b>			
Professional development including travel	29,433	475	29,908
Due diligence travel	70,949	1,145	72,094
Total travel and meetings	100,382	1,620	102,002
<b>General</b>			
Research and information services	268,846	4,338	273,184
Membership dues	16,335	264	16,599
Office supplies	1,568	25	1,593
Periodicals and publications	10,393	168	10,561
Miscellaneous expense	13,393	216	13,609
Total general	310,535	5,011	315,546
Total internal investment activity expenses	\$3,366,920	\$54,328	\$3,421,248



## ADDITIONAL FINANCIAL INFORMATION

*Pension Trust Funds***Schedules of Administrative Expenses | Year Ended June 30, 2016**

	MSEP	Judicial Plan	Total
<b>Personnel services</b>			
Salaries	\$4,132,399	\$ 66,680	\$4,199,079
Fringe benefits	1,721,978	27,786	1,749,764
Total personnel services	5,854,377	94,466	5,948,843
<b>Professional services</b>			
Actuarial services	303,720	4,901	308,621
Attorney services	189,991	3,066	193,057
Auditing services	75,630	1,220	76,850
Banking services	34,927	564	35,491
Consulting services	136,752	2,207	138,959
Total professional services	741,020	11,958	752,978
<b>Communications</b>			
Video production	1,285	21	1,306
Telephone	52,606	849	53,455
Printing	38,534	622	39,156
Postage and mailing	134,048	2,163	136,211
Total communications	226,473	3,655	230,128
<b>Facilities</b>			
Depreciation	109,939	1,774	111,713
Utilities	54,387	878	55,265
Facility maintenance	48,345	780	49,125
Vehicle maintenance and operation	5,550	90	5,640
Total facilities	218,221	3,522	221,743
<b>Software and equipment</b>			
Computer supplies and software	96,537	1,558	98,095
Depreciation	222,400	3,589	225,989
Maintenance agreements	314,122	5,069	319,191
Equipment rental	134,717	2,174	136,891
Loss on sale of equipment	8,634	139	8,773
Total software and equipment	776,410	12,529	788,939
<b>Education, meetings and travel</b>			
Board travel and meetings	33,118	534	33,652
Professional development including travel	79,227	1,278	80,505
MOSERS sponsored seminars	77,340	1,248	78,588
Due diligence travel	1,721	28	1,749
Tuition reimbursement	18,418	297	18,715
Total education, meetings and travel	209,824	3,385	213,209
<b>General</b>			
Advertising	27,320	438	27,758
Research and information services	99,900	1,612	101,512
Insurance	132,021	2,130	134,151
Membership dues	33,770	545	34,315
Business continuity	62,244	1,004	63,248
Office supplies	12,030	194	12,224
Periodicals and publications	95,755	1,545	97,300
Miscellaneous	10	0	10
Total general	463,050	7,468	470,518
Total administrative expenses	\$8,489,375	\$136,983	\$8,626,358

## ADDITIONAL FINANCIAL INFORMATION

*Internal Service Funds***Schedules of Administrative Expenses | Year Ended June 30, 2016**

	Life and LTD	Deferred Compensation	Total
<b>Personnel services</b>			
Salaries	\$290,285	\$270,585	\$ 560,870
Employee fringe benefits	119,875	102,677	222,552
Total personnel services	410,160	373,262	783,422
<b>Professional services</b>			
Auditing services	1,847	37,259	39,106
Banking services	651	0	651
Total professional services	2,498	37,259	39,757
<b>Communications</b>			
Postage and mailing	7,188	0	7,188
Telephone	3,409	1,228	4,637
Printing	2,698	80	2,778
Video production expense	81	1,385	1,466
Total communications	13,376	2,693	16,069
<b>Facilities</b>			
Building use charge	34,786	6,838	41,624
Utilities	3,877	0	3,877
Maintenance	3,316	0	3,316
Total facilities	41,979	6,838	48,817
<b>Software and equipment</b>			
Computer supplies and equipment	6,487	2,629	9,116
Depreciation	0	2,658	2,658
Equipment maintenance	21,463	537	22,000
Equipment rental	9,168	0	9,168
Total software and equipment	37,118	5,824	42,942
<b>Education, meetings and travel</b>			
Board travel and meetings	2,180	0	2,180
Professional development including travel	6,761	9,720	16,481
MOSERS sponsored seminars	4,835	0	4,835
Due diligence travel	120	3,840	3,960
Total education, meetings and travel	13,896	13,560	27,456
<b>General</b>			
Advertising	1,858	9,492	11,350
Research and information services	6,980	14,600	21,580
Insurance	9,243	0	9,243
Membership dues	2,360	925	3,285
Business continuity	6,062	0	6,062
Office supplies	4,495	282	4,777
Periodicals and publications	818	0	818
Total general	31,816	25,299	57,115
Total administrative expenses	\$550,843	\$464,735	\$1,015,578

## Schedules of Professional Service Fees | Year Ended June 30, 2016

Professional Services	Nature of Service	Pension Trust Funds			Internal Service Funds		
		MSEP	Judicial Plan	Total	Life and LTD	Deferred Compensation	Total
<b>Operation administrative expenses</b>							
Avtex Solutions, Inc.	Information technology consulting	\$ 39,776	\$ 642	\$ 40,418	\$ 0	\$ 0	\$ 0
Central Bank	Banking	34,570	558	35,128	453	0	453
Charlesworth & Associates	Risk management consulting	9,945	160	10,105	0	0	0
Collector Solutions, Inc.	Banking	357	6	363	198	0	198
Cortex	Board asset advisor search	31,246	504	31,750	0	0	0
Cross Reporting Service, Inc.	Legal counsel	313	5	318	0	0	0
Dell	Information technology consulting	13,910	224	14,134	0	0	0
DocSTAR	Information technology consulting	14,171	229	14,400	0	0	0
Gabriel, Roeder, Smith & Co.	Actuarial	303,720	4,901	308,621	0	0	0
Gamble & Schlemeier, Ltd.	Governmental consulting	24,603	397	25,000	0	0	0
Huber & Associates	Information technology consulting	757	12	769	0	0	0
HyperGen, Inc.	Information technology consulting	886	14	900	0	0	0
Kramer & Frank, PC	Legal counsel	124	2	126	0	0	0
Midwest Litigation Services	Legal counsel	63	1	64	0	0	0
Monaco, Sanders, Rachine, Powell & Riedy	Legal counsel	369	6	375	0	0	0
Step toe & Johnson	Legal counsel	849	14	863	0	0	0
Thompson Coburn, LLP	Legal counsel	188,144	3,036	191,180	0	0	0
United States District Court	Legal counsel	129	2	131	0	0	0
Williams Keepers, LLC	Financial audit	75,630	1,220	76,850	1,847	37,259	39,106
World Wide Technology	Information technology consulting	1,458	25	1,483	0	0	0
Operation administrative expenses subtotal		741,020	11,958	752,978	2,498	37,259	39,757
<b>Internal investment administrative expenses</b>							
Kasowitz, Benson, Torres & Friedman, LLP	Legal counsel	764	12	776	0	0	0
Thompson Coburn LLP	Legal counsel	66,265	1,070	67,335	0	0	0
Internal investment administrative expenses subtotal		67,029	1,082	68,111	0	0	0
<b>Total professional service fees</b>		<b>\$808,049</b>	<b>\$13,040</b>	<b>\$821,089</b>	<b>\$2,498</b>	<b>\$37,259</b>	<b>\$39,757</b>

Information on investment management and consulting fees can be found in the *Schedule of Investment Expenses* on pages 59-60.

## ADDITIONAL FINANCIAL INFORMATION

## Pension Trust Funds

## Investment Summary | Year Ended June 30, 2016

Type of Investment	June 30, 2015		Purchases & Capital Additions at Cost	Sales & Redemptions at Cost	June 30, 2016		Percent of Total Fair Value
	Cost Value	Fair Value			Cost Value	Fair Value	
<b>Fixed income</b>							
Treasury bonds, notes, and bills	\$ 4,164,585,678	\$ 4,109,906,639	\$ 346,074,426	\$ (590,112,427)	\$3,920,547,677	\$ 3,958,718,113	42%
Gov't. bonds and gov't. mortgage-backed securities	53,233,538	43,001,590	7,023,361	(4,449,364)	55,807,535	47,606,027	1
Corporate bonds	1,207,470	847,433	78,467	(1,096,163)	189,774	111,600	0
Convertible bonds	0	0	911,071	0	911,071	968,785	0
International corporate bonds	5,782,442	3,964,906	1,152,036	(5,405,514)	1,528,964	1,263,124	0
Bank loans	555,751	98	0	(555,751)	0	0	0
<b>Total fixed income</b>	<b>4,225,364,879</b>	<b>4,157,720,666</b>	<b>355,239,361</b>	<b>(601,619,219)</b>	<b>3,978,985,021</b>	<b>4,008,667,649</b>	<b>43</b>
<b>Venture capital limited partnerships</b>	<b>3,198,991,680</b>	<b>4,827,465,957</b>	<b>442,041,533</b>	<b>(636,647,950)</b>	<b>3,004,385,263</b>	<b>4,267,419,604</b>	<b>46</b>
<b>Common stock</b>	<b>374,656,847</b>	<b>415,247,698</b>	<b>11,440,087</b>	<b>(88,778,964)</b>	<b>297,317,970</b>	<b>286,901,771</b>	<b>3</b>
<b>International investments</b>							
International equities	178,019,681	858,319,652	1,108,155	(3,798,909)	175,328,927	789,143,593	8
Foreign currency	83,401	(2,687)	7,519,605	(54)	7,602,952	7,821,688	0
<b>Total international investments</b>	<b>178,103,082</b>	<b>858,316,965</b>	<b>8,627,760</b>	<b>(3,798,963)</b>	<b>182,931,879</b>	<b>796,965,281</b>	<b>8</b>
<b>Real estate investment trust</b>	<b>3,617</b>	<b>10,056</b>	<b>0</b>	<b>0</b>	<b>3,617</b>	<b>10,646</b>	<b>0</b>
<b>Options futures</b>	<b>0</b>	<b>0</b>	<b>9,198,200</b>	<b>(9,281,820)</b>	<b>(83,620)</b>	<b>(10,658,205)</b>	<b>0</b>
<b>Investments (per Statements of Fiduciary Net Position page 24)</b>	<b>7,977,120,105</b>	<b>10,258,761,342</b>	<b>826,546,941</b>	<b>(1,340,126,916)</b>	<b>7,463,540,130</b>	<b>9,349,306,746</b>	<b>100%</b>
<b>Short-term investments</b>							
Short-term investment funds	2,237,306,891	2,237,306,892	1,168,825,843	(951,659,938)	2,454,472,796	2,454,472,796	
Repurchase agreements	12,153,028	12,153,028	2,296,621,949	(2,299,106,761)	9,668,216	9,668,216	
<b>Total short-term investments</b>	<b>2,249,459,919</b>	<b>2,249,459,920</b>	<b>3,465,447,792</b>	<b>(3,250,766,699)</b>	<b>2,464,141,012</b>	<b>2,464,141,012</b>	
<b>Invested securities lending collateral</b>							
Corporate bonds	839,357	149,065	0	(120,592)	718,765	37,210	
Short-term investment funds	19,078,986	19,078,986	342,852,240	(347,709,849)	14,221,377	14,221,377	
<b>Total invested securities lending collateral</b>	<b>19,918,342</b>	<b>19,228,051</b>	<b>342,852,240</b>	<b>(347,830,441)</b>	<b>14,940,142</b>	<b>14,258,587</b>	
<b>Total investments</b>	<b>\$10,246,498,366</b>	<b>\$12,527,449,313</b>	<b>\$4,634,846,973</b>	<b>\$ (4,938,724,056)</b>	<b>\$9,942,621,284</b>	<b>\$11,827,706,345</b>	

## ADDITIONAL FINANCIAL INFORMATION

*Internal Service Funds***Investment Summary** | Year Ended June 30, 2016

Type of Investment	June 30, 2015		Purchases and Capital Additions at Cost	Sales and Redemptions at Cost	June 30, 2016		Percent of Total Fair Value
	Cost Value	Fair Value			Cost Value	Fair Value	
Repurchase agreements	\$4,482,083	\$4,482,083	\$1,098,605,133	\$(1,099,152,174)	\$3,935,042	\$3,935,042	100%

Note: 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.





## **Investment Section**

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## Chief Investment Officer's Report



### Missouri State Employees' Retirement System

Mailing Address: PO Box 209, Jefferson City, MO 65102-0209

Phone: (573) 632-6100 • (800) 827-1063 | Fax: (573) 632-6103

MO Relay: 7-1-1 (Voice) • (800) 735-2966 (TTY)

Website: [www.mosers.org](http://www.mosers.org) | Email: [mosers@mosers.org](mailto:mosers@mosers.org)

Visit us at 907 Wildwood Drive, Jefferson City, MO

October 14, 2016

Dear Members:

I am pleased to present the *Investment Section* of the MOSERS *Comprehensive Annual Financial Report* for the fiscal year ended June 30, 2016.

The MOSERS portfolio generated a time-weighted rate of return, based on fair value, of 0.3% for the year ended June 30, 2016, net of all fees and expenses. The result was below our 8% assumed rate of return and underperformed our policy benchmark by 7.1%. In no uncertain terms – this is a disappointing result.

Since this is my first annual letter, I would like to thank Rick Dahl, Gary Findlay, and John Watson for giving me the chance to protect the retirement interests of over 114,000 current and former state employees and their families. However, ultimately it took the confidence of a board to allow me to serve in this role. So, I owe appreciation to Antwaun Smith, Lori Neidel, Laura Davis, Don Martin, Senators Joe Keaveny and Wayne Wallingford, Representatives Mike Leara and Caleb Jones, Treasurer Clint Zweifel and Commissioner Doug Nelson. Rest assured, I come to work every day with the mission of making the board reflect on their decision with pride, by delivering an investment return that allows for a dignified retirement for our state's public servants.

For the second year in a row, the performance of the portfolio has underperformed the 8% assumed rate of return. In addition, time frames that have traditionally been viewed as “long-term” are underperforming the assumed rate of return. Large asset portfolios, like MOSERS, get the return broadly available to the type of portfolio of assets owned. While the CIO can attempt to add value in the margin, return cannot be created where it doesn't exist. Ultimately, assumed asset returns have not materialized. This problem is not unique to MOSERS – much of the institutional asset management community has systematically overestimated the returns from investing for 20 years. We will continue to work at this challenge with the understanding that adding risk to the portfolio is not the answer. Retirement, regardless of the type of plan it comes in, is more expensive today than it was 20 years ago.

The low return environment will be challenging for all investors. While the investment staff can't create returns, we can manage costs by rationalizing active management and improve our diversification to most efficiently earn market returns. We will continue to work on the things we can manage.

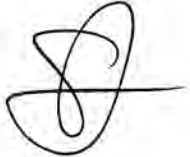
The causes of this year's underperformance are easily diagnosed and understood. However, performance deserves a critical review. This year's result notwithstanding, being different from the benchmark can be positive. The best success with active management comes when the effort is focused on risk management. To this end, traditionally, we have used active management to avoid over-priced risks in favor of risks with higher future returns – and have been successful. The best long-term returns come from those investors willing to take a contrary approach – buying unloved assets while selling adored assets. While this approach has an ability to make one look foolish in the short-term, in the long-term, it has resulted in higher returns and proves patience will financially accrue to the investor willing to focus on large margins of safety.

Our internal strategies, which are heavily biased toward undervalued assets, told us to buy the most cyclically sensitive sectors too early. Internal strategies, like emerging markets and higher actual inflation, caused a portion of this year's underperformance. Being contrary in the financial markets, unfortunately, means you are constantly at odds with the momentum crowd. This friction is created because the momentum crowd determines an asset is worth owning due to its appreciated price. That same crowd ignores the fact that, all else equal, a lower price makes the asset more attractive and represents lower risk in the future (since a majority of the risk was observed in the price decline).

External manager selection stands out as being particularly problematic this year. The last several years, we made changes to benchmarks without corresponding changes to the manager roster. Our external active management was used to deemphasize U.S. corporate growth. The return environment for the assets that diversify US corporate growth has been difficult, which caused our external managers to underperform. We will continue to transform the active manager roster, but are patient enough to ensure the transformation is positive for the fund.

So what does this mean for the future? It means we will focus on the things we can control; namely, management fees, the portfolio's diversification and the portfolio's active management. While the return environment might remain difficult, staff will focus on putting the fund in the best position for success over the long term.

Sincerely,

A handwritten signature in black ink, appearing to be 'Seth Kelly', with a stylized, cursive script.

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:

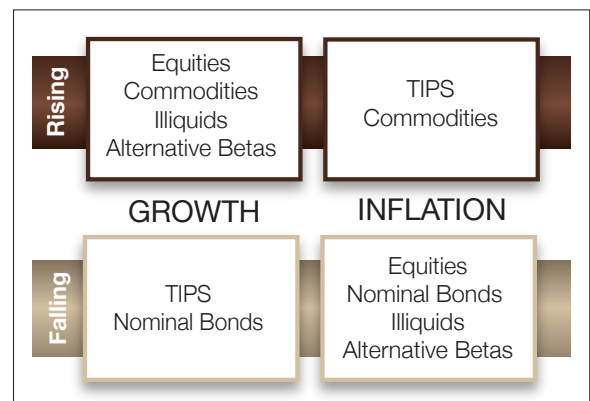
- Develop a real return objective (RRO) that will keep contribution rates reasonably level over long periods of time, absent changes in actuarial assumptions.
- Establish a risk-balanced allocation policy that is expected to meet the RRO over long periods of time, while minimizing the impact of the fund's volatility on the contribution rate.
- Maximize the return per unit of cost of the investment program through the efficient use of internal and external resources.

### Investment Beliefs

MOSERS' internal investment staff and external general asset consultant have arrived at investment beliefs, which are the foundation for implementation of the investment portfolio to achieve the board'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 the allocation and balancing of risk; it is the allocation of risk that drives portfolio returns.** While investment returns receive a lot of public attention, understanding and balancing 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. Therefore, it is rational to construct a portfolio that is believed to combat various economic conditions. The illustration above reflects various economic environments and the types of investments that should be expected to perform well in those environments.
- **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. Exposures 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.

#### Economic Environments





- **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 while ensuring the RRO is achieved.
- **Flexibility to opportunistically alter the portfolio away from risk-balanced 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."<sup>1</sup> Specifically related to investments, the board is charged with the duties of establishing and maintaining broad policies and objectives for the investment program along with the recommendations of staff and the external asset consultants.

#### 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 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.

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<sup>1</sup> 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 records, 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 as of June 30, 2012.

### Asset Allocation

Beta-Balanced Portfolio (80% of total capital)	Risk Allocation Policy	Risk Allocation Ranges <sup>1</sup>	Benchmark Index (weight) <sup>2</sup>	Illiquids Portfolio <sup>6</sup> (20% of total capital)	Benchmark Index (weight)
Global equity	20%	13% - 27%	MSCI ACWI <sup>3</sup> — (19%)	Total Illiquids	S&P 500 + 3% (20%) <sup>7</sup>
Nominal bonds	20%	13% - 27%	Barclays Long Treasury — (37%)		
Inflation-indexed bonds	20%	13% - 27%	Barclays 1-10 TIPS — (64%)		
Commodities	20%	13% - 27%	S&P GSCI <sup>4</sup> — (17%)		
Alternative betas	20%	13% - 27%	AQR DELTA <sup>5</sup> — (31%)		

<sup>1</sup> 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).

<sup>2</sup> 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.

<sup>3</sup> Morgan Stanley Capital International All Country World Index (net dividends).

<sup>4</sup> S&P Goldman Sachs Commodity Index (formerly Goldman Sachs Commodity Index).

<sup>5</sup> A diversified risk-balanced portfolio of liquid hedge fund risk premia managed by AQR Capital net of management fees.

<sup>6</sup> Illiquids portfolio upper limit of 27.5% of capital, no new commitments past 23%.

<sup>7</sup> Legacy real estate and timber assets are benchmarked to the Dow Jones U.S. Select REIT Index and NCREIF Timber respectively.

## 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 (5.5% in FY16) 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 return 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, 2016, the MOSERS investment portfolio had a fair value of \$8.2 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 0.3%, net of fees, for FY16. The total fund return trailed the 1-year policy benchmark by 7.1%, but over the last 20-year period has outperformed the policy benchmark by 0.8% on an annualized basis.

### 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 FY16 is equal to the RRO of 5.5% plus inflation. The best known measure of inflation is the Consumer Price Index (CPI).<sup>2</sup>

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.

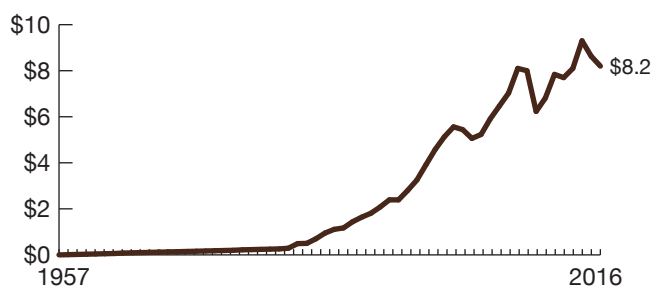
As indicated in the center bar chart, MOSERS' investment returns exceeded the required rate of return by 0.5% over the 20-year period ended June 30, 2016.<sup>3</sup>

### Investment Performance vs. Benchmark Comparisons

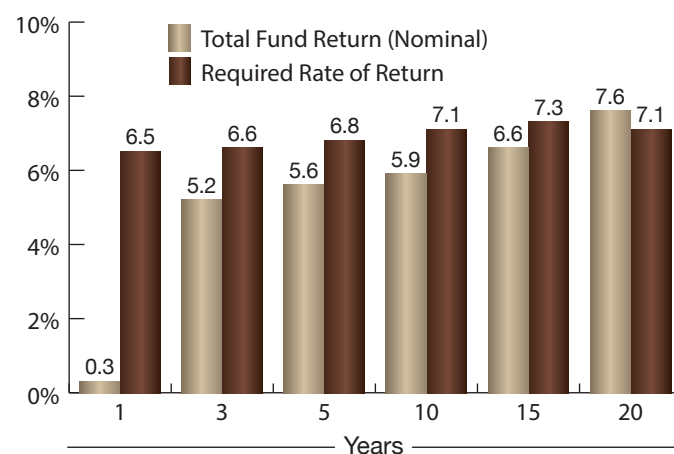
In addition to measuring performance relative to the required rate of return, the board also compares fund returns to the policy benchmark and the strategy benchmark. Returns for the total fund versus these benchmarks are displayed in the bar chart to the right.

The policy benchmark provides an indication of the returns that could have been achieved (excluding transaction costs) by a portfolio invested passively in the broad market with percentage weights allocated to each asset class in MOSERS' policy asset allocation.

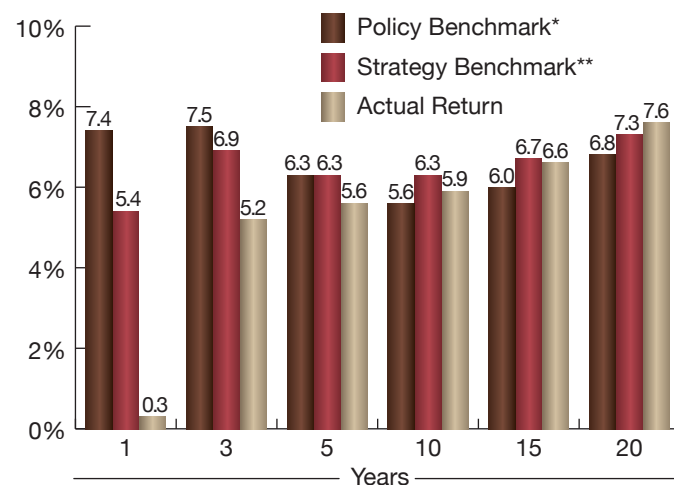
Total Fund Growth (Billions)



Total Fund Actual Return vs. Required Rate of Return



Total Fund Actual Return vs. Benchmark Return



\* As of June 30, 2016, the policy benchmark was comprised of the following components: 80% total beta-balanced policy benchmark and 20% total illiquids portfolio policy benchmark.

\*\* As of June 30, 2016, the strategy benchmark was comprised of the following components: 81.2% total beta-balanced strategy benchmark and 18.8% total illiquids portfolio policy benchmark.

<sup>2</sup> CPI Source: United States Department of Labor, Bureau of Labor Statistics (not seasonally adjusted).

<sup>3</sup> Performance returns are calculated using a time-weighted rate of return on fair values.



Comparison of the total return to the policy benchmark is a reflection of the extent to which the asset allocation kept pace with the system's funding objectives. The total fund 1-, 3-, and 5-year actual performance underperformed its policy benchmark by 7.1%, 2.3%, and 0.7% with the actual 10-, 15-, and 20-year returns exceeding the policy benchmarks by 0.3%, 0.6%, and 0.8%, respectively.

The strategy benchmark is more narrowly defined and focuses on sub-asset class allocation decisions made by the CIO. By comparing the policy benchmark to the strategy benchmark, the board is able to determine the value added through strategic decisions (active management) made by the CIO. Value is created when the strategy benchmark returns exceed the policy benchmark returns.

### Total Fund Actual Return vs. Benchmark Returns

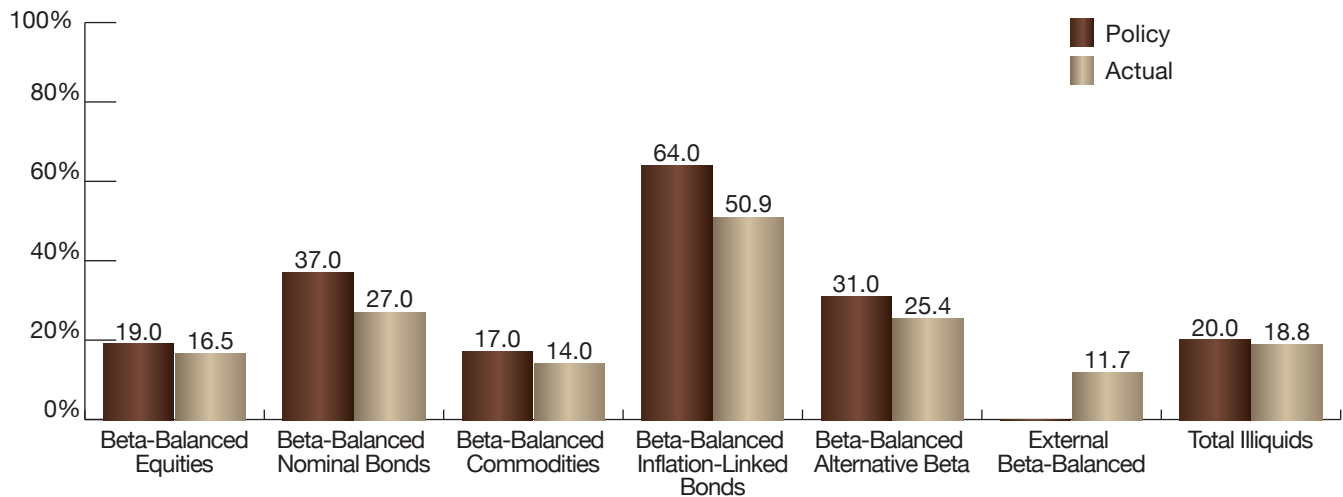
Similarly, by comparing the actual return to the strategy benchmark, the board will, over the long term, be able to judge the success or failure of the staff and the consultant in implementing the CIO's strategic decisions. The primary implementation decision is in determining which managers the fund should employ. Value is added from manager selection when the total fund return exceeds the strategy benchmark return.

### Total Fund Policy Allocation Overview

As of June 30, 2016, the board's broad policy allocation mix was 80% beta-balanced and 20% illiquids. The policy target, as of June 30, 2016, 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.

**Total Fund Allocation** | Policy vs. Actual (As a Percentage of the Total Fund)



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, 2016.

### Total Fund - Correlation Table - 5 Years

	Beta-Balanced Equities	Beta-Balanced Nominal Bonds	Beta-Balanced Commodities	Beta-Balanced Inflation-Indexed Bonds	Beta-Balanced Alternative Beta	Illiquids
Beta-balanced equities	1.00					
Beta-balanced nominal bonds	(0.53)	1.00				
Beta-balanced commodities	0.59	(0.42)	1.00			
Beta-balanced inflation-indexed bonds	0.23	0.46	0.23	1.00		
Beta-balanced alternative beta	0.39	(0.07)	(0.06)	0.21	1.00	
Illiquids	0.43	(0.28)	0.22	(0.02)	0.34	1.00

### Total Fund - Statistical Performance

Portfolio Characteristics	1 Year	3 Year	5 Year	10 Year	15 Year	20 Year
Annualized return	0.3%	5.2%	5.6%	5.9%	6.6%	7.6%
Annualized standard deviation	7.6%	6.9%	7.4%	8.8%	8.9%	9.4%
Sharpe ratio	0.02	0.74	0.75	0.56	0.59	0.56
Excess return*	(7.1)%	(2.3)%	(0.7)%	0.3%	0.6%	0.8%
Beta*	0.95	0.92	0.83	0.74	0.80	0.84
Annualized alpha*	(6.5)%	(1.6)%	0.3%	1.6%	1.7%	1.7%
Correlation*	0.92	0.94	0.95	0.95	0.95	0.96
Value added in dollars**	\$(603M)	\$(568M)	\$(252M)	\$491M	\$1.1B	\$1.5B

\* 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, 2016

	Fair Value	Percentage of Investments at Fair Value	Market Exposure	Percentage of Investments at Market Exposure
<b>Internal beta-balanced</b>				
Beta-balanced equities	\$1,156,949,774	14.1%	\$ 1,358,911,157	16.5%
Beta-balanced nominal bonds	669,269,342	8.1	2,222,780,778	27.0
Beta-balanced commodities	364,077,818	4.4	1,155,946,291	14.0
Beta-balanced inflation-indexed bonds	1,329,465,125	16.2	4,189,752,830	50.9
Beta-balanced alternative betas	2,188,780,688	26.7	2,093,608,307	25.4
Total internal beta-balanced	5,708,542,747	69.5	11,020,999,363	133.8
External beta-balanced	963,611,551	11.7	963,611,551	11.7
Illiquids	1,549,202,065	18.8	1,549,202,065	18.8
Residual accounts from old portfolio	2,980,696	0.0	2,980,696	0.0
Cash reserve	3,538,652	0.0	0	0.0
<b>Grand total</b>	<b>\$8,227,875,711</b>	<b>100.0%</b>	<b>\$13,536,793,675</b>	<b>164.3%</b>
Reconciliation to				
<i>Statements of Fiduciary Net Position</i>				
Total portfolio value	\$8,227,875,711			
Reverse repurchase agreements	3,601,461,597			
Short-term investment fund (STIF)	(2,454,472,797)			
Uninvested cash	40,581			
Interest and dividends receivable	(53,130,415)			
Variation margin	16,251,526			
Accounts receivable securities sold	(37,033,265)			
Accounts payable securities purchased	36,690,153			
Fees payable	10,942,073			
Securities lending liability	681,582			
Investments per				
<i>Statements of Fiduciary Net Position</i>	<b>\$9,349,306,746</b>			

## Investment Advisors

Investment Advisors Name	Style	Portfolio Fair Value
Actis	Illiquid — emerging markets	\$ 41,204,066
Alinda Capital Partners	Illiquid — infrastructure	27,244,000
American Industrial Partners	Illiquid — corporate buyout	37,441,562
AQR Capital Management	Beta-balanced — multi-strategy	390,077,788
AQR Capital Management	Beta-balanced — risk parity	404,066,465
Axiom Asia Private Capital Associates	Illiquid — emerging markets	75,894,301
Axxon Group	Illiquid — emerging markets	16,347,160
Bayview Asset Management	Illiquid — opportunistic mortgages	58,918,656
Blackstone Alternative Asset Management	Beta-balanced — fund-of-funds	348,119,832
Blackstone Real Estate Partners	Illiquid — active real estate	190,586,379
Blakeney Management	Beta-balanced — emerging markets	51,220,393
Bridgepoint Capital Partners	Illiquid — corporate buyout	41,079,666
Bridgewater Associates	Beta-balanced — global macro	85,456,582
Bridgewater Associates	Beta-balanced — risk parity	483,712,947
Campbell Group	Illiquid — timberland	988,067
CarVal Investors	Illiquid — distressed real estate debt	20,400,000
Castlelake	Illiquid — special situations	17,171,363
Catalyst Capital Group	Illiquid — Canadian distressed debt	99,509,169
Catterton Partners	Illiquid — corporate buyout	66,219,051
Cornwall Capital	Beta-balanced — multi-strategy	70,233,163
Davidson Kempner Capital Management	Beta-balanced — event driven	26,355,338
Development Partners International	Illiquid — emerging markets	33,338,843
DRI Capital	Illiquid — intellectual property	16,692,841
EIG Energy Partners	Illiquid — energy (mezzanine)	50,207,693
Elliott Management Corporation	Beta-balanced — multi-strategy	142,229,000
Eton Park Capital Management	Beta-balanced — multi-strategy	866,874
Farallon Capital Partners	Beta-balanced — multi-strategy	3,370,000
Gaoling Fund	Beta-balanced — long/short equity	97,979,140
Gateway Energy Partners	Illiquid Energy — diversified	28,860,890
Glenview Capital Management	Beta-balanced — long/short equity	23,397,247
Glenview Capital Management Sidecar	Beta-balanced — equity	46,939,367
Global Forest Partners	Illiquid — timberland	194,505,557
Harvest Fund Advisors	Illiquid — active MLP	115,728,434
HBK Capital Management	Beta-balanced — merger arbitrage	52,905,567
JLL Partners	Illiquid — corporate buyout	71,853,068
King Street Capital Management	Beta-balanced — credit driven	5,032,883
Linden Capital Partners	Illiquid — corporate buyout	44,387,942
Mast Capital Management	Beta-balanced — credit driven	49,671,221
Merit Energy Company	Illiquid — energy (oil & gas)	8,083,711
MHR Fund Management	Illiquid — distressed debt	56,609,596
Millennium Technology Value Partners	Illiquid — direct secondaries	18,228,547
New Mountain Capital	Illiquid — corporate buyout	39,957,258
NISA Investment Advisors	Beta-balanced	289,535,435
Oaktree Capital Management	Illiquid — opportunistic European loans	693,254
Oaktree Capital Management	Illiquid — real estate	1,508,999
Oaktree Capital Management	Illiquid — corporate buyout	12,061,652
Oaktree Capital Management	Illiquid — distressed debt	27,963,156
PAAMCO	Beta-balanced — fund-of-funds	1,209,487
Pharo Management	Beta-balanced — global macro	107,174,309

Investment Advisors continued on page 79

*Investment Advisors continued from page 78*

Investment Advisors Name	Style	Portfolio Fair Value
Resource Management Service — Wildwood Timberlands	Illiquid — timberland	73,982,899
Silchester International Investors	Beta-balanced — international equity	786,326,162
Silver Creek Capital Management	Illiquid — fund-of-funds (special situations)	27,682,847
Silver Lake Management Company	Illiquid — corporate buyout	6,086,464
SIR Capital Management	Beta-balanced — equity market neutral	93,088,991
Siris Capital Group	Illiquid — corporate buyout	31,068,792
State Street Global Advisors	Beta-balanced — emerging markets	177,607,652
StepStone Group	Illiquid — fund-of-funds (corporate buyout)	26,022,153
Stone Harbor Investment Partners	Beta-balanced — emerging market debt	49,822,089
TPG-Axon Capital	Residual — long/short credit	1,218,105
Veritas Capital	Illiquid — corporate buyout	69,105,512
Viking Global Investors	Beta-balanced — long/short equity	155,547,959
Visium Asset Management	Beta-balanced — long/short equity	92,131,486
Wellington Hedge Management Company	Beta-balanced — long/short equity	538,042
Miscellaneous (each less than \$1M)		3,322,058
		<u>\$5,686,789,130</u>



## Total Fund - Top Ten Publicly Traded Separate Account Holdings

<b>Ten Largest Holdings as of June 30, 2016*</b>	<b>Fair Value</b>	<b>Percent of the Total Fund</b>
U.S. Treasury Inflation Index Note — 2.000%, 2025	\$243,278,326	2.93%
U.S. Treasury Inflation Index Note — 0.375%, 2023	230,097,424	2.78
U.S. Treasury Inflation Index Note — 0.125%, 2023	223,243,759	2.69
U.S. Treasury Inflation Index Note — 0.125%, 2019	209,193,723	2.52
U.S. Treasury Inflation Index Note — 0.125%, 2018	208,621,253	2.52
U.S. Treasury Inflation Index Note — 0.625%, 2021	200,207,791	2.42
U.S. Treasury Inflation Index Note — 0.625%, 2024	193,557,125	2.33
U.S. Treasury Inflation Index Note — 0.125%, 2022	180,097,606	2.17
U.S. Treasury Inflation Index Note — 0.125%, 2022	177,672,339	2.14
U.S. Treasury Inflation Index Note — 0.375%, 2025	174,013,120	2.10

\* 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, 2016, the policy benchmark was comprised of the following components: 80% total beta-balanced policy benchmark and 20% total illiquids portfolio policy benchmark. The individual asset class benchmarks, as listed below, are used to generate the total fund policy benchmark.

- **Beta-balanced** - As of June 30, 2016, the total beta-balanced policy benchmark was comprised of the following components: 24% MSCI ACWI Net, 46% Barclays Long Treasuries, 21% Goldman Sachs Commodity, 80% Barclays U.S. TIPS 1-10 YR, and 39% AQR Delta. This program did not begin until September 2012.
- **Illiquids** - As of June 30, 2016, the illiquids benchmark was comprised of the following components: 62.1% S&P 500 +3%, 18.2% Dow Jones U.S. Select REIT, and 19.7% NCREIF Timber. This program did not begin until September 2012.

	1 Year	3 Year	5 Year	10 Year	15 Year	20 Year
<b>Total fund *</b>						
MOSERS	0.3%	5.2%	5.6%	5.9%	6.6%	7.6%
Composite total return benchmark	7.4%	7.5%	6.3%	5.6%	6.0%	6.8%
<b>Beta-balanced**</b>						
MOSERS	0.6%	4.1%	N/A	N/A	N/A	N/A
Beta-balanced composite benchmark	6.8%	5.4%	N/A	N/A	N/A	N/A
<b>Illiquids**</b>						
MOSERS	(1.5)%	7.3%	N/A	N/A	N/A	N/A
Illiquids benchmark	9.3%	13.5%	N/A	N/A	N/A	N/A

\* Time weighted rates of return on fair values adjusted for cash flows.

\*\* Beta-balanced inception date was September 1, 2012

## Investment Manager Fees | For the Year Ended June 30, 2016

	Total Fees	Manager Fees	Fund Pass Through Expenses (1)	Incentive Fees Earned & Paid in FY16	Portfolio Company Charges (2)
<b>Beta-balanced portfolio</b>					
Aeolus Property Catastrophe Spire Fund, LP	\$ 21,398	\$ 4,948	\$ 0	\$ 16,450	\$ 0
AQR Absolute Return Institutional Fund, LP	3,298,207	166,350	61,697	3,070,160	0
AQR DELTA Sapphire Fund, LP	4,346,063	3,888,412	457,651	0	0
AQR Global Risk Premium Fund IV, LP	2,429,356	1,993,900	435,456	0	0
AQR Style Premia Fund, LP	1,122,353	0	60,845	1,061,508	0
Blackstone Topaz Fund, LP	4,679,429	3,333,797	494,253	851,379	0
Blakeney Onyx, LP	1,611,599	1,035,530	576,069	0	0
Brevan Howard, LP	1,513,331	1,052,940	460,391	0	0
Bridgewater Associates — All Weather @12%, LLC	2,053,363	1,766,341	287,022	0	0
Bridgewater Associates — Diamond Ridge Fund, LLC	3,551,520	3,454,902	96,618	0	0
Cornwall Domestic, LP	3,097,320	1,327,897	506,613	1,262,810	0
Davidson Kempner Institutional Partners, LP	983,061	445,387	92,325	445,349	0
Elliott International, Ltd.	3,726,997	1,772,232	1,089,112	865,653	0
Empyrean Capital Fund, LP	(66,532)	80,223	0	(146,755)	0
Farallon Capital Institutional Partners, LP	(156,376)	0	0	(156,376)	0
Gaoling Fund, LP	235,915	82,500	17,340	136,075	0
Glenview Capital Opportunity Fund, LP	(1,749,485)	159,168	140,951	(2,049,604)	0
Glenview Sidecar	10,423	0	10,423	0	0
Harvest Fund Advisors, LLC	923,096	923,096	0	0	0
HBK Merger Strategies Offshore Fund, Ltd.	1,493,051	252,365	75,200	1,165,486	0
HBK Offshore Fund, Ltd.	192,536	465,957	160,360	(433,781)	0
King Street Capital, LP	339,285	129,895	0	209,390	0
King Street Capital, Ltd.	7,482	7,326	0	156	0
Mast Credit Opportunities I, LP	431,705	879,350	196,927	(644,572)	0
NISA Investment Advisors	4,686,733	4,686,733	0	0	0
Perry Partners, LP	524	524	0	0	0
Pharo Macro Fund, Ltd.	3,127,879	2,198,352	130,297	799,230	0
Silchester International Investors	4,177,416	4,177,416	0	0	0
SSGA Emerging Markets	192,584	192,584	0	0	0
Standard Investment Research Hedged Equity Fund	3,732,195	2,341,385	182,276	1,208,534	0
Stone Harbor Investment Partners	279,587	279,587	0	0	0
Viking Global Equities III, Ltd.	2,540,614	2,385,186	155,428	0	0
Visium Balanced Fund, LP	2,146,808	2,119,863	378,515	(351,570)	0
<b>Total beta-balanced managers</b>	<b>54,979,437</b>	<b>41,604,146</b>	<b>6,065,769</b>	<b>7,309,522</b>	<b>0</b>
<b>Illiquids portfolio</b>					
Actis Emerging Markets III	626,000	593,000	33,000	0	0
Actis Emerging Markets IV	844,000	720,000	124,000	0	0
African Development Partners I, LLC	(614,768)	354,085	179,855	(1,148,708)	0
African Development Partners II, LLC	792,373	742,217	50,156	0	0
Alinda Infrastructure Fund I, LP	426,327	406,172	20,155	0	0
American Industrial Partners Capital Fund V, LP	1,063,226	691,420	66,768	305,038	0
American Industrial Partners Capital Fund VI, LP	597,380	503,429	93,951	0	0
Axiom Asia Private Capital Fund II, LP	621,426	351,000	35,124	235,302	0
Axiom Asia Private Capital Fund III, LP	956,831	500,000	52,350	404,481	0
Axxon Brazil Private Equity Fund II B, LP	1,001,065	608,184	392,881	0	0
Bayview Opportunity Domestic LP	435,698	132,763	95,487	207,448	0
Bayview Opportunity Domestic III b, LP	1,798,471	1,056,835	332,271	409,365	0
Blackstone Real Estate Partners IV	(729,418)	0	56,170	(785,588)	0
Blackstone Real Estate Partners V	558,454	0	70,444	488,010	0
Blackstone Real Estate Partners VI	(1,369,512)	386,181	29,204	(1,784,897)	0
Blackstone Real Estate Partners VII	2,836,879	786,009	67,523	1,983,347	0
Bridgepoint Europe III A, LP	92,954	67,013	25,941	0	0
Bridgepoint Europe IV B, LP	290,469	260,783	29,686	0	0
Campbell Timber Fund II A, LP	487,720	473,042	14,678	0	0

Investment Manager Fees continued on page 83

## Investment Manager Fees continued from page 82

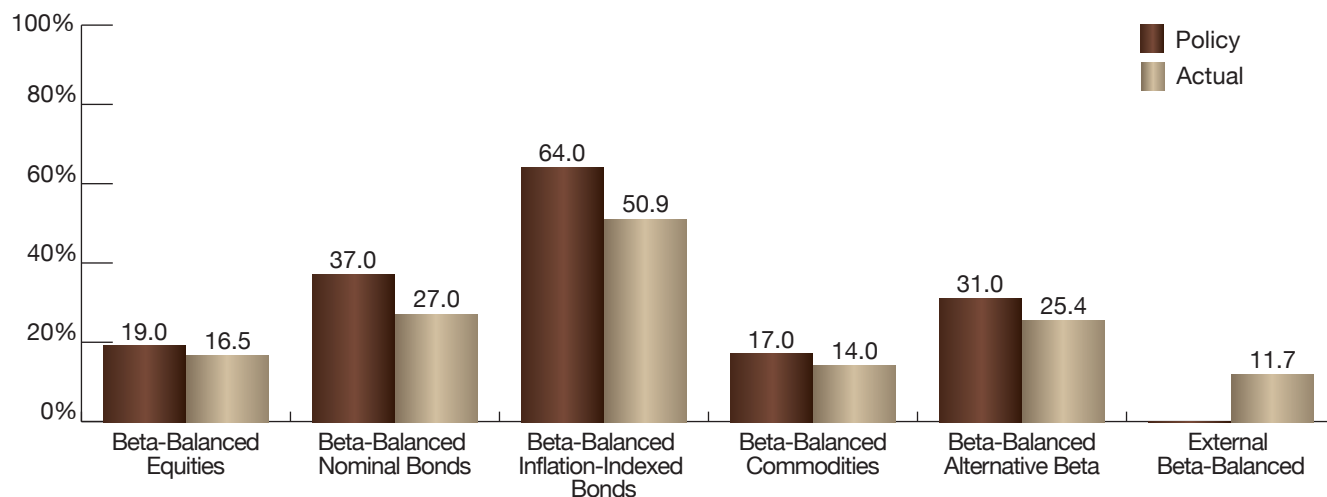
	Total Fees	Manager Fees	Fund Pass Through Expenses (1)	Incentive Fees Earned & Paid in FY16	Portfolio Company Charges (2)
CarVal Investors CVI					
Global Value Fund A, LP — private debt	55,403	157,991	47,997	(150,585)	0
CarVal Investors CVI					
Global Value Fund A, LP — real estate	55,403	157,991	47,997	(150,585)	0
Castlelake Aviation II, LP	1,524,248	591,062	209,811	723,375	0
Catalyst Fund Limited Partnership III, LP	(311,423)	906,356	90,401	(1,308,180)	0
Catalyst Fund Limited Partnership IV, LP	783,255	453,178	90,767	239,310	0
Catalyst Fund Limited Partnership V, LP	2,573,537	2,307,087	266,450	0	0
Catterton Partners V, LP	145,197	114,545	17,041	0	13,611
Catterton Partners VI, LP	382,813	306,114	25,472	30,368	20,859
Catterton Partners VII, LP	1,474,212	600,000	22,327	851,885	0
DRI Capital - LSRC	399,403	169,600	147,462	82,341	0
EIG Energy Fund Co-investment	8,635	0	8,635	0	0
EIG Energy Fund XIV, LP	395,839	324,082	71,334	0	423
EIG Energy Fund XV, LP	(1,602,817)	521,630	65,508	(2,195,315)	5,360
EIG Energy Fund XVI, LP	542,177	499,973	42,199	0	5
Garnet Sky Investors Company, Ltd.	(1,286,597)	636,754	112,412	(2,035,763)	0
Gateway Energy & Resource Holdings, LLC	292,705	23,646	375,803	(106,744)	0
Global Forest Partners GTI7					
Institutional Investors Company, Ltd.	754,727	618,411	136,316	0	0
JLL Partners Fund V, LP	(62,153)	165,594	8,696	(236,443)	0
JLL Partners Fund VI, LP	1,337,921	505,807	29,378	802,736	0
Linden Capital Partners II, LP	675,660	656,737	18,923	0	0
Merit Energy Partners F-II, LP	251,019	146,104	104,915	0	0
MHR Institutional Partners II A, LP	(2,926,824)	0	55,651	(2,982,475)	0
MHR Institutional Partners III, LP	(7,454,232)	397,700	86,983	(7,938,915)	0
MHR Institutional Partners IV, LP	943,236	875,000	68,236	0	0
Millennium Technology Value Partners II, LP	230,213	500,000	35,825	(305,612)	0
New Mountain Partners III, LP	3,900,536	320,869	15,002	3,535,965	28,700
OCM/GFI Power Opportunities Fund II, LP	32,765	8,834	4,828	19,103	0
OCM Opportunities Fund IV b, LP	21,199	0	7,692	13,507	0
OCM Opportunities Fund VII b, LP	(788,307)	215,734	49,657	(1,053,698)	0
OCM Opportunities Fund VIII b, LP	49,919	324,738	101,850	(376,669)	0
OCM Power Opportunities Fund III, LP	1,444,106	350,308	32,967	1,060,831	0
OCM Real Estate Opportunities Fund III, LP	(364,000)	0	63,966	(427,966)	0
Resource Management Service —					
Wildwood Timberlands, LLC	400,661	365,556	35,105	0	0
StepStone Capital Buyout Fund I, LP	3,844	36,998	62,897	(96,051)	0
StepStone Capital Buyout Fund II, LP	104,727	74,899	29,828	0	0
StepStone Opportunities Fund II, LP	81,685	17,512	82,487	(18,314)	0
Silver Lake Partners II, LP	505,259	70,924	4,517	429,818	0
Siris Partners II, LP	615,936	184,627	50,066	242,757	138,486
Siris Partners III, LP	679,704	610,352	62,012	0	7,340
The Veritas Capital Fund III, LP	59,225	100,991	17,828	(119,806)	60,212
The Veritas Capital Fund IV, LP	2,297,903	417,133	16,864	1,693,855	170,051
<b>Total illiquid portfolio managers</b>	<b>18,942,294</b>	<b>23,366,970</b>	<b>4,593,749</b>	<b>(9,463,472)</b>	<b>445,047</b>
<b>Residual portfolio</b>					
BlackRock Financial Management Bank Loans	1,533	1,533	0	0	0
TPG-Axon Partners (Offshore), Ltd.	(8,159)	0	0	(8,159)	0
<b>Total residual portfolio managers</b>	<b>(6,626)</b>	<b>1,533</b>	<b>0</b>	<b>(8,159)</b>	<b>0</b>
<b>Grand totals</b>	<b>\$73,915,105</b>	<b>\$64,972,649</b>	<b>\$10,659,518</b>	<b>\$(2,162,109)</b>	<b>\$445,047</b>

(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.

## Beta-Balanced Asset Class Summary

**Beta-Balanced Allocation** | Policy vs. Actual (As a Percentage of the Total Fund)



For the year ended June 30, 2016, the beta-balanced allocation returned 0.6%. The slightly positive return was driven primarily by the strong positive performance of nominal bonds offset by the poor performance of commodities.

### Highlights

- External active management decisions this year, primarily the external managers in the alternative beta and external risk parity allocation, caused the return to be 3.5% below our policy benchmark.
- Strategic decisions led to an additional 2.7% underperformance versus our policy benchmark. Overweights to emerging markets, foreign developed markets, and energy were the primary drivers of the strategic underperformance.

### Portfolio Structure

The goal of the beta-balanced portfolio is to equalize the portfolio's risk exposure across economic environments through risk-balanced allocations to assets. The assets currently being used in the beta-balanced portfolio are global equities, U.S. nominal bonds, inflation-indexed bonds, commodities and alternative betas.

There is both an internal and external component of the beta-balanced portfolio. 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.

### Market Overview

In general, slow growth and continued global economic uncertainty led to tempered returns for risk assets during the year. Volatility was one of the bigger stories of the year with most markets down sharply during the first seven months of the fiscal year and then rebounding significantly over the next five months. For instance, global equities were down 11% during the first seven months of the year, but recovered to finish the year down 3.5%. Emerging market equities experienced an even more dramatic ride being down 23% and recovering to finish down 12%. Commodities were down 36% after January and finished the year down 26%. Even more dramatic, oil was down 54% and finished the year down "only" 15%. Similar to last year, assets were weaker abroad than they were at home with U.S. equities up 3% for the year while developed international equities were down 10% and emerging markets were down 12%. For the second consecutive year, the bright spot was long U.S. treasury bonds which were up almost 19% as people continued to react to the weakness in the global economies.

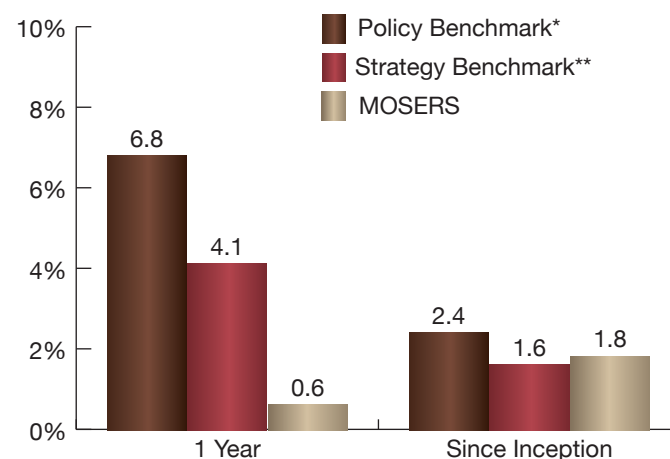


## Performance

For FY16, the beta-balanced portfolio returned 0.6% versus 6.8% for the policy benchmark. The portfolio mirrored the volatility of the markets, down 11% at the end of January, but recovered to finish slightly positive at 0.6%. On an absolute basis, the portfolio suffered due to poor performance in commodities (down 29%) and global equities (down 7%). Those losses were partially offset by the strong performance of nominal bonds (up 18%). The primary driver of the underperformance was alternative beta performance versus its policy (+1.1% vs +6.6%, respectively). Global equities also underperformed by 3.2% (-6.7% vs -3.5%). Finally, the external risk parity managers returned (0.9%), significantly underperforming the policy of 6.8%. The bar chart to the right illustrates actual performance as compared to the policy and strategy benchmarks since inception. A description of each asset class follows:

- **Global equities:** The notional value of the equity portfolio on June 30, 2016, was \$1,358,911,157, representing 16.5% of total notional exposure. For the fiscal year, the equity allocation returned (6.7%) versus (3.5%) for the global equity policy benchmark. The underperformance was driven by the overweight to emerging and international developed markets.
- **Long treasuries (nominal bonds):** As of June 30, 2016, the notional value of the long treasury portfolio was \$2,222,780,778, representing 27.0% of total notional exposure. For the fiscal year, the long treasury allocation returned 17.9% versus 18.9% for the long treasury policy benchmark. Preferring to own TIPS in lieu of nominal treasuries and the tracking error associated with our futures implementation were the cause of the slight underperformance this year.
- **TIPS (inflation-indexed bonds):** As of June 30, 2016, the notional value of the TIPS portfolio was \$4,189,752,830, representing 50.9% of total notional exposure. For the fiscal year, the TIPS allocation returned 2.9% versus 3.2% for the TIPS policy benchmark. There was no internal or external active management strategy during the year; thus providing a return that closely matched the benchmark.
- **Alternative beta:** As of June 30, 2016, the notional value of the alternative beta portfolio was \$2,093,608,307, representing 25.4% of total notional exposure. The alternative beta allocation returned 1.1% for the fiscal year versus 6.6% for alternative beta policy benchmark. The under-performance was attributable to active hedge fund managers who collectively represented approximately 65% of the allocation and returned (1.2%) for the year.
- **External beta-balanced:** This allocation is composed of AQR Global Risk Premium and Bridgewater All-Weather. As a portfolio, they returned (0.9%) for the fiscal year and represented 11.7%, or \$963,611,551 of market exposure. Similar to the internal portfolio, their performance was the result of below average results from most asset classes and a particularly large loss in commodities. As a portfolio, these two managers underperformed their benchmark for the year by 7.7%.

## Beta-Balanced Return vs. Benchmark Returns



\* As of June 30, 2016, the total beta-balanced policy benchmark was comprised of the following components: 24% MSCI ACWI Net, 46% Barclays Long Treasuries, 21% S&P GSCI, 80% Barclays U.S. TIPS 1-10 YR, and 39% 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, 2016, the total beta-balanced strategy benchmark was comprised of the following components: 24.3% MSCI ACWI Net, 40.5% Barclays Long Treasuries, 20.5% S&P GSCI, 75.1% Barclays U.S. TIPS 1-10 YR, and 38.2% AQR Delta. All strategy return components are adjusted for financing cost associated with the beta-balanced program. This program did not begin until September 2012.

**Additional Portfolio Information**

The table below shows the brokerage activity and statistical performance that occurred within the beta-balanced portfolio in FY16.

**Beta-Balanced - Brokerage Activity**

	Shares Traded	Volume of Trades	Commissions Paid
Barclays Capital	4,265	\$ 76,699	\$ 128
BMO Capital Markets	14,789	428,836	74
BNY Convergenx	181,552	5,451,859	1,864
BTIG, LLC	38,413	1,143,739	1,152
Cantor Fitzgerald & Co., Inc.	1,186	45,367	36
Citigroup Global Markets, Inc.	100,275	3,987,932	3,008
Converge, LLC	72,703	3,025,648	727
FBR Capital Markets & Co.	127,825	3,574,632	3,835
Jefferies & Co., Inc.	1,048,455	26,074,841	5,242
Jonestrading Institutional Services, LLC	5,051	97,960	152
Liquidnet, Inc.	50,347	2,026,174	1,007
Merlin Securities, LLC	349,164	11,905,756	3,262
Merrill Lynch Pierce Fenner Smith, Inc.	10,631	308,314	319
Morgan Stanley & Co., Inc.	40,466	6,278,120	3,117
Pickering Energy Partners	21,716	731,075	651
Raymond James & Associates, Inc.	30,021	619,343	901
RBC Capital Markets, LLC	229,700	7,021,452	1,148
UBS Securities, LLC	13,117	384,808	315
USCA Securities, LLC	137,954	2,462,241	4,139
Weeden & Co.	323,432	7,138,055	4,422
Wells Fargo Securities, LLC	1,684,895	43,949,229	11,139
	4,485,957	\$126,732,080	\$46,638

**Beta-Balanced - Statistical Performance**

Portfolio Characteristics	1 Year	Since Inception (September 2012)
Return	0.6%	1.8%
Annualized standard deviation	9.4%	8.8%
Sharpe ratio	0.05	0.20
Excess return*	(6.2)%	(0.6)%
Beta*	1.17	1.04
Annualized alpha*	(7.1)%	(0.7)%
Correlation*	0.94	0.95

\* As compared to the beta-balanced policy benchmark.

## Illiquids Asset Class Summary

For the year ended June 30, 2016, the illiquid investments portfolio returned (1.5%). Over this period, the positive returns from private equity and timber, 5.4% and 6.8%, respectively, were offset by negative returns from the private debt and real estate (including energy) segments of the portfolio, which returned (9.6%) and (14.2%), respectively.

### Highlights

- The illiquid investments portfolio holds a broad set of assets that are diversified by asset class, asset type, and geography. Over long periods of time the portfolio is expected to achieve attractive returns while contributing to the diversification of the total portfolio.
- At the end of the fiscal year, illiquid investments made up 18.8% of the total portfolio, which was below its target allocation of 20.0%.

### Portfolio Structure

The illiquid investments portfolio holds a variety of assets that were acquired over a number of years. A portion of these assets are expected to benefit during periods of economic growth, while others are expected to perform relatively well during periods of rising inflation. Like the beta-balanced portfolio, the illiquid investments portfolio distributes its risk among a broad group of assets that perform differently across various economic environments.

The illiquid portfolio's current structure includes private equity, private debt, real estate, timber, energy and infrastructure assets. Looking a bit deeper, these asset categories include investments in domestic buyout, European buyout, emerging market private equity, U.S. private debt, Canadian private debt, U.S. and non-U.S. real estate, and global exposures to timber, energy, and infrastructure.

### Market Overview

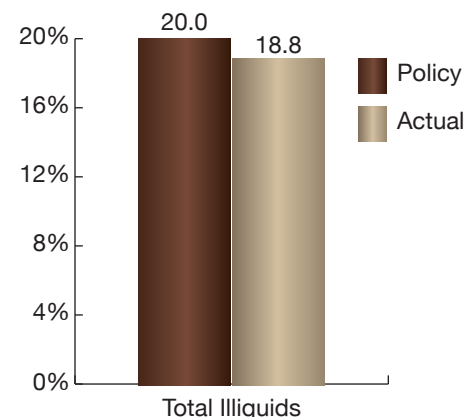
The following paragraphs briefly describe the markets where the illiquid investments portfolio has substantial exposure.

Private investments had another positive year, though performance varied widely depending on the strategy and geography. For the year ended June 30, 2016, fundraising for private investments remained strong, although the amount of capital raised was below the amount raised in the same period in 2015. The number of initial public offerings in the U.S., as well as the amount of proceeds raised, declined substantially in the twelve months ended June 2016, compared to 2015. For the one-year ended March 31, 2016, the Institutional Limited Partners Association (ILPA) Private Markets Benchmark-All Funds Index achieved a net-of-fee pooled IRR (internal rate of return) of 5.2%. This index, which measures the return of a broad group of private investments, is calculated by ILPA, in partnership with Cambridge Associates, and lags public benchmarks due to reporting delays that are inherent to the asset class. Among the numerous private market segments, European private equity and venture capital significantly outperformed, measured in U.S. dollars, the All Funds Index. Conversely, the natural resource segment substantially underperformed the All Funds Index, due primarily to the volatility experienced in the energy sector.

The institutional real estate market encompasses a number of property types, including office, apartment, retail, industrial, and hotel. A convenient method of gaining exposure to this asset class is to invest in publicly traded Real Estate Investment Trusts (REITs). The REIT market, as represented by the Dow Jones U.S. Select REIT Index, returned 22.9% for the year ended June 30, 2016, which is substantially above its long-term average. Investors can also participate in the real estate market outside of the public markets by investing in properties directly or through a private fund that owns underlying properties. The National Council of Real Estate Investment Fiduciaries (NCREIF) tracks domestic investment grade income producing properties that are owned by tax-exempt institutional investors. For the latest fiscal year, the NCREIF Property Index (NPI), a benchmark that measures the performance of private real estate, returned 10.6%.

### Illiquids Allocation

(As a Percentage of the Total Fund)



Timber is an asset class that possesses some characteristics that differentiate it from other assets in the portfolio. For instance, timber can provide investors with periodic cash distributions over extended time periods. In some cases, these distributions can be managed by actively adjusting the harvest schedules depending on market conditions. That is, more timber can be cut and sold when prices are attractive, or harvests can be delayed to avoid weak pricing. When harvests are delayed, the trees continue to grow and add volume making them more valuable. This predictable and steady growth is a characteristic that many other assets don't possess. To measure the performance of private timberlands in the U.S., the NCREIF Timberland Index is commonly used. For the year ended June 30, 2016, the index returned 3.4%.

## Performance

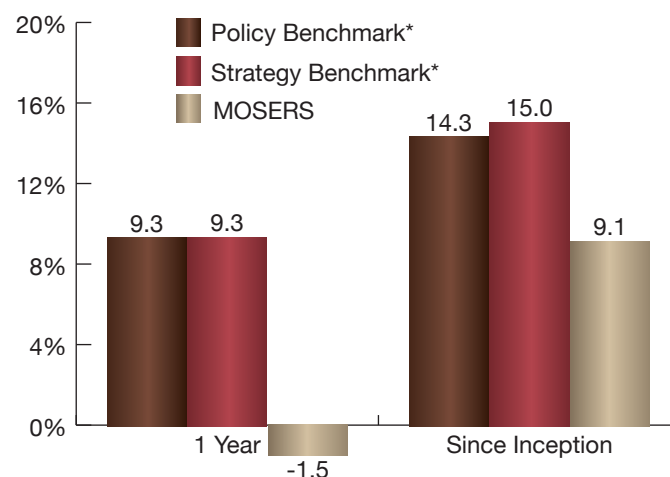
Assessing the performance of a portfolio of illiquid investments has always been a challenge. The current policy benchmark is a composite of several indexes, the proportion of each varies month to month to mirror the exposures in the portfolio. In order for a benchmark to be considered appropriate, a number of criteria should be met. These criteria include: the assets in the benchmark must be identifiable in advance, the index must be investable, the index should be calculated frequently, and it should be consistent with the manager's investment style. While a great deal of thought and effort has gone into the selection of the benchmarks, a number of these criteria are not fully met, particularly where private investments are involved.

The illiquid investments portfolio, as of June 30, 2016, had a fair value of \$1,549,202,065, and represented 18.8% of the fund's total investments. For the fiscal year, the illiquid investments portfolio returned (1.5%), net of fees. Over this same period, the illiquid investments policy benchmark, a blend of asset class policy indexes, returned 9.3%. The current structure of the total portfolio was adopted in September 2012, which for this narrative, is the inception date. Over that period, the illiquid investments portfolio has returned an annualized 9.1%, net of fees. Over this same period of three years and 10 months, the illiquid investments policy benchmark has achieved an annualized return of 14.3%. The returns for the latest year and since inception are illustrated in the bar chart above.

As previously mentioned, the benchmark of the illiquid investments portfolio is a blend of three indexes: S&P 500 Index plus 3%, the Dow Jones U.S. Select REIT Index and the NCREIF Timberland Index. Below are some additional details on each of these portfolio segments:

- The system's investments in private equity (domestic and European buyout, emerging market private equity and infrastructure) and private debt make up the part of the illiquid portfolio that is benchmarked against the S&P 500 Index plus 3%. For the fiscal year, the private equity and private debt portfolio returned 5.4% and (9.6%), respectively. This performance is mixed when compared to the benchmark return of 7.0%. Since inception, the private equity and private debt portfolio returned an annualized 11.7% and 7.2%, respectively, compared to the benchmark return of 16.4%.
- MOSERS' investments in private real estate and energy comprise the part of the illiquid portfolio that is benchmarked against the Dow Jones U.S. Select REIT Index. For the fiscal year, these assets returned (14.2%), compared to the benchmark return of 22.9%. The system's private energy investments were the primary driver of the negative return over this period. Since inception, this portion of the portfolio returned an annualized 6.0%, compared to the benchmark return of 12.1%.
- The system's timber holdings are benchmarked against the NCREIF Timberland Index. For the fiscal year, these assets returned 6.8%, compared to the benchmark return of 3.4%. Since inception, this portion of the portfolio has returned an annualized 9.4%, compared to the benchmark return of 8.5%.

**Illiquids Return vs. Benchmark Returns**



\* As of June 30, 2016, the illiquids policy and strategy benchmarks were comprised of the following components: 62.1% S&P 500 +3%, 18.2% DJ U.S. Select REIT Index, and 19.7% NCREIF Timber.

While it is interesting to monitor shorter-term performance, illiquid investments should be evaluated over a long time frame. By looking at performance over multi-year periods, the short term volatility is removed and managers of illiquid assets are allowed sufficient time to build and possibly exit their investments. Over the latest ten years ending June 30, 2016, the illiquid investments portfolio returned 7.7%, which is 1.5% under the policy index return of 9.2%.

### Additional Portfolio Information

The table below shows the statistical performance of the illiquid investments portfolio in FY16.

#### Illiquids - Statistical Performance

Portfolio Characteristics	1 Year	Since Inception (September 2012)
Return	(1.5)%	9.1%
Annualized standard deviation	3.0%	3.7%
Sharpe ratio	(0.54)	2.43
Excess return*	(10.8)%	(5.2)%
Beta*	0.07	0.17
Annualized alpha*	(2.1)%	6.4%
Correlation*	0.26	0.41

\* As compared to the beta-balanced policy benchmark.



## Securities Lending Program

During the fiscal year ending June 30, 2016, MOSERS' net loss through its securities lending program was \$49. 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 FY16, income from domestic equity decreased due to a decrease in the average lendable balance, average on loan and lending margin. 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 ten years of activity for the securities lending program.

### Domestic Equity

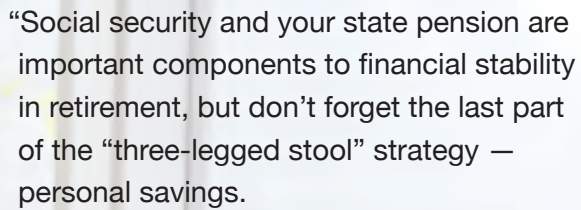
Fiscal Year	Average Lendable	Average on Loan	Average Utilization	Lending Margin (Basis Points)	Net Income (Loss)
2007	\$711,856,029	\$281,338,681	39.5%	14.0	\$ 994,416
2008	440,025,347	195,971,154	44.5	36.6	1,611,536
2009	307,082,718	114,261,769	37.2	52.0	1,596,245
2010	321,114,801	83,944,408	26.1	26.9	864,401
2011	376,047,357	111,263,248	29.6	16.5	619,648
2012	424,041,044	145,373,164	34.3	19.1	810,972
2013	238,024,131	69,543,634	29.2	25.1	596,941
2014	187,154,236	62,768,614	33.5	22.6	422,422
2015	168,456,525	53,517,452	31.8	6.9	116,204
2016	117,553,687	36,503,528	31.1	0.0	(49)

### International Equity

Fiscal Year	Average Lendable	Average on Loan	Average Utilization	Lending Margin (Basis Points)	Net Income
2007	\$485,230,034	\$41,033,858	8.5%	8.1	\$395,017
2008	467,893,205	56,994,925	12.2	15.5	726,565
2009	342,215,198	32,267,851	9.4	14.9	510,622
2010	277,251,343	19,736,528	7.1	4.0	109,946
2011	320,082,404	88,623,017	27.7	10.4	333,000
2012	309,052,299	47,666,253	15.4	7.5	230,655
2013	192,359,434	49,525,171	25.7	5.6	108,379
2014	0	0	0.0	0.0	0
2015	0	0	0.0	0.0	0
2016	0	0	0.0	0.0	0

### Fixed Income

Fiscal Year	Average Lendable	Average on Loan	Average Utilization	Lending Margin (Basis Points)	Net Income
2007	\$ 950,069,746	\$695,743,093	73.2%	15.5	\$1,469,860
2008	1,082,813,165	894,372,380	82.6	56.4	6,104,526
2009	859,512,525	517,356,516	60.2	43.3	3,722,523
2010	836,242,270	190,547,907	22.8	2.8	230,031
2011	805,579,308	505,690,676	62.8	7.2	581,875
2012	776,256,144	516,553,974	66.5	6.4	496,074
2013	622,620,959	427,442,773	68.7	5.1	315,060
2014	247,256,630	185,527,243	75.0	4.4	108,552
2015	0	0	0.0	0.0	0
2016	0	0	0.0	0.0	0



I've been a state employee for nearly 30 years. Six months after I began working, I learned of the deferred compensation program. The first month I contributed, also marked the stock market's historic "Black Monday" event. While scary at the time, I've had positive growth and compound interest over the years, which has made for a very nice return on my contributions.

That “perfect time” to start saving will not happen on its own. Start by saving small amounts monthly and you’ll be invigorated as you see your money grow over time. That \$20 becomes hundreds, then thousands, and can become tens-of-thousands of dollars saved.”

– Daniel

*Fulton State Hospital (DMH)*

*"That 'perfect time' to start saving will not happen on its own. Start by saving small amounts monthly and you'll be invigorated as you see your money grow over time."*



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## Actuary's Certification Letter



Gabriel Roeder Smith & Company  
Consultants & Actuaries

One Towne Square  
Suite 800  
Southfield, MI 48076-3723

248.799.9000 phone  
248.799.9020 fax  
www.gabrielroeder.com

October 14, 2016

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

Dear Board Members:

The basic financial objective of the Missouri State Employees' Retirement System (MOSERS), as stipulated under Missouri Revised Statutes 104.440 and 104.1066, is to establish and receive contributions which:

- (1) when expressed in terms of percents of active member payroll will remain approximately level from generation to generation of Missouri citizens, and which
- (2) when combined with present assets and future investment return will be sufficient to meet the present and future financial obligations of MOSERS.

In order to measure progress toward this fundamental objective, MOSERS performs annual actuarial valuations on the Missouri State Employees' Retirement Plan (MSEP) and the Judges Retirement Plan (Judicial Plan). The purposes of the valuations are to (i) measure present financial position, and (ii) establish contribution rates that provide for the normal cost and level percent of payroll amortization of unfunded actuarial accrued liabilities over a reasonable period. The latest completed actuarial valuations were based upon data and assumptions as of June 30, 2016, presented to the board in separate reports issued September 7, 2016 (Judicial Plan) and September 9, 2016 (MSEP). These valuations indicate that the calculated contribution rates for the fiscal year ending June 30, 2018, for the benefits scheduled to be in effect on and after July 1, 2016, meet the basic financial objective. These contribution rates are 19.45% of payroll for 49,464 active MSEP members, and 62.09% of payroll for 408 Judicial Plan members.

At the September 17, 2014, board meeting, the board adopted a minimum funding policy. Specifically, the minimum employer contribution rate will remain at the level calculated in the June 30, 2013, valuation until the respective plans are individually 80% funded. These contribution rates are 16.97% of payroll for active MSEP members, and 58.45% of payroll for Judicial Plan members, both of which are below the current rates and therefore do not apply.

The GASB 67 disclosures were issued on September 30, 2016, in a separate report due to the expressed intent of GASB to disconnect reporting requirements from funding requirements.

The actuarial valuations are based upon financial and participant data which is prepared by retirement system staff, assumptions regarding future rates of investment return, salary increases, inflation, and assumptions regarding rates of retirement, turnover, death, and disability among MSEP and Judicial Plan members and their beneficiaries. The data is reviewed by us for internal and year-to-year consistency as well as general reasonableness prior to its use in the actuarial valuations. It is also summarized and tabulated for the purpose of analyzing trends.

We are not responsible for the accuracy or completeness of the data. The demographic assumptions were adopted by the board of trustees on June 16, 2016, based upon recommendations made in an experience study covering the period from July 1, 2010 to June 30, 2015. The economic assumptions were adopted by the board of trustees on June 16, 2016. The assumptions and methods used in this valuation comply with the current actuarial standards of practice.



The benefit structure is outlined in the actuarial section of the annual report. 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*.

Based upon the valuation results, it is our opinion that the Missouri State Employees' Retirement Plan and the Judicial Retirement Plan continue to operate in accordance with actuarial principles of level percent of payroll financing. To the best of our knowledge the information contained in this report is accurate and fairly presents the actuarial position of the plans as of the valuation date. All calculations have been made in conformity with generally accepted actuarial principles and practices, with the Actuarial Standards of Practice issued by the Actuarial Standards Board and with applicable statutes.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law.

This certification letter should not be relied on for any purpose other than the purposes described. Determinations of the financial results associated with the benefits described in this report in a manner other than the intended purpose may produce significantly different results.

David T. Kausch and Brad Lee Armstrong are independent of the plan sponsor and Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

Respectfully submitted,



David T. Kausch, FSA, EA, FCA, MAAA  
Senior Consultant & Chief Actuary



Brad Lee Armstrong, ASA, EA, FCA, MAAA  
Senior Consultant & Actuary



## Summary of Actuarial Assumptions

### Economic Assumptions

The economic assumptions were adopted by the board on June 16, 2016, to be first effective for the June 30, 2016, valuations. The assumed rate of return on investments used in the FY16 valuations was 7.65% per year, compounded annually (net after investment expenses). This assumption takes into consideration that equal amounts of money payable at different points in time in the future do not have the same value presently.

Pay increase assumptions for individual active members are shown for sample ages on pages 94 and 96. A portion of the assumption for each age represents merit and/or seniority increase, and the other 3% recognizes wage inflation. This assumption is used to project a member's current salary to the salaries upon which benefits will be based.

The active member payroll is assumed to increase 3% annually, which is the portion of the individual pay increase assumptions attributable to wage inflation. The annual cost-of-living adjustment (COLA) is assumed to be 4%, on a compounded basis, when a minimum COLA of 4% is in effect (4% for 12 years, 3.06% the next year to reach a cumulative 65% followed by 2%). When no minimum COLA is in effect, price inflation is assumed to be 2.5% and the annual COLA is assumed to be 2% (80% of 2.5%), on a compounded basis.

The table to the right provides the assumed rate of return (ARR) on investments, assumed price inflation (API), and real return objective (RRO) for the past ten valuation years.

Valuation Year	ARR %	API %	RRO %
2016	7.65%	2.50%	5.15%
2015	8.00	2.50	5.50
2014	8.00	2.50	5.50
2013	8.00	2.50	5.50
2012	8.00	2.50	5.50
2011	8.50	3.20	5.30
2010	8.50	3.20	5.30
2009	8.50	3.20	5.30
2008	8.50	3.50	5.00
2007	8.50	3.50	5.00

### Non-Economic Assumptions

The demographic assumptions were adopted by the board on June 16, 2016, to be first effective for the June 30, 2016, valuation. The mortality table, for post-retirement mortality, used in evaluating allowances to be paid was the RP-2014 Healthy Annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 120%. Related values are shown on pages 94 and 96. This assumption is used to measure the probabilities of each benefit payment being made after retirement. The pre-retirement 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. The pre-retirement mortality table used for Long-Term Disability (LTD) members was the RP-2014 Disabled mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females.

The probabilities of age and service retirement are shown on page 95. It was assumed that each member will be granted 4 months (5 months for 2011 plan members) of service credit for unused leave upon retirement and 4 months of military service purchases (0 months for 2011 plan members). The probabilities of withdrawal from service, disability and death-in-service are shown on pages 94-96. For disability retirement, impaired longevity was recognized by use of special mortality tables.

The entry age normal actuarial cost method of valuation was used in determining liabilities and normal cost. Each member's normal cost was based on the benefit provisions applicable to that member. The normal cost is projected to the applicable fiscal year. Differences in the past between assumed experience and actuarial 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 level percents of payroll contributions.

The amortization of the unfunded actuarial accrued liability is based on a closed 30-year amortization period, level percent of payroll amortization. This method was first effective with the June 30, 2014 valuation. The amortization is based on the projected unfunded actuarial accrued liability to the beginning of the fiscal year during which the contributions are expected to be made. The unfunded accrued actuarial liability (UAAL) payment is calculated such that the minimum employer contribution rate will be at least 16.97% of payroll and 58.45% for judges (the rate calculated in the June 30, 2013 valuation) until such a time as each plan is at least 80% funded. When the plan becomes at least 80% funded, the remaining closed amortization period will be used to calculate the employer contribution rate to be made. Employer contribution dollars were assumed to be paid in equal installments throughout the employer's fiscal year.

The valuation assets used to determine funding requirements recognize assumed investment income fully each year. Differences between actual and assumed investment return are phased-in over an open five-year period. Valuation assets are not permitted to deviate from the market value by less than 80% or more than 125%.

The data about persons now covered and about present assets were furnished by the system's administrative staff. Although examined for general reasonableness, the data was not audited by the actuary.

The liabilities for active members hired on or after January 1, 2011, were based on MSEP 2011 benefits. The liabilities for active members hired on or after July 1, 2000, (April 26, 2005 for administrative law judges) were based on MSEP 2000 benefits. The liabilities for active members hired before July 1, 2000, for elected officials, General Assembly, and uniformed water patrol were based on MSEP benefits. The liabilities for all other active members hired before July 1, 2000, were based on the assumption that members would elect MSEP 2000 prior to age 62 and MSEP on or after age 62.

For members on long-term disability, the actuarial accrued liability is the present value of benefits under active assumptions and projecting salary by 3.0% (wage inflation assumption) per year from the year of disability to the current year to reflect indexing of pay in ultimate retirement benefits.

The actuarial valuation computations were made by or under the supervision of a Member of the American Academy of Actuaries (MAAA).

### MSEP - Retirement Values | June 30, 2016

Sample Attained Ages	Present Value of \$1/Month the First Year (with 50% Joint & Survivor) Increasing 4.0%/2.0% Yearly		Present Value of \$1/Month the First Year Increasing 2.0% Yearly		Future Life Expectancy (Years)			
	Old Plan COLA		New Plan COLA		Service		Disability	
	Men	Women	Men	Women	Men	Women	Men	Women
40	\$232.55	\$233.39	\$188.71	\$192.71	40.95	43.52	31.67	37.37
45	224.67	225.75	180.96	186.10	36.33	38.90	28.24	33.43
50	215.04	216.17	171.72	177.90	31.84	34.33	25.02	29.63
55	203.45	204.34	160.97	167.90	27.52	29.85	21.99	26.06
60	189.59	189.93	148.53	155.96	23.38	25.49	19.08	22.66
65	172.99	172.53	133.99	141.77	19.40	21.29	16.23	19.25
70	153.41	152.07	117.23	125.31	15.62	17.28	13.44	15.89
75	131.21	128.92	98.73	106.89	12.13	13.56	10.80	12.77
80	107.27	104.17	79.34	87.21	9.03	10.22	8.40	10.01
85	83.33	79.90	60.48	67.65	6.42	7.37	6.33	7.71

### MSEP - Separations From Active Employment Before Service Retirement and Individual Pay Increase Assumptions | June 30, 2016

Sample Ages	Years of Service	Percent of Active Members Separating Within the Next Year						Pay Increase Assumptions for an Individual Employee			
		Withdrawal*		Death**		Disability		Years of Service	Merit and Seniority***	Base (Economy)	Increase Next Year
		Men	Women	Men	Women	Men	Women				
	0	24.0%	27.5%					1	5.75%	3.00%	8.75%
	1	19.0	21.5					2	2.50	3.00	5.50
	2	15.5	16.3					3	1.50	3.00	4.50
	3	13.3	13.5					4	1.25	3.00	4.25
	4	11.2	11.3					5	1.00	3.00	4.00
25	5+	13.5	14.0	0.03%	0.01%	0.10%	0.10%	6	1.00	3.00	4.00
30		10.6	11.0	0.03	0.02	0.10	0.10	7	1.00	3.00	4.00
35		8.2	8.5	0.04	0.03	0.10	0.10	8	1.00	3.00	4.00
40		5.8	6.0	0.05	0.03	0.36	0.36	9	0.75	3.00	3.75
45		4.3	4.5	0.07	0.05	0.41	0.41	10	0.50	3.00	3.50
50		2.9	3.0	0.13	0.08	0.57	0.57	15	0.50	3.00	3.50
55		2.9	3.0	0.22	0.14	0.77	0.77	20	0.50	3.00	3.50
60		2.9	3.0	0.40	0.20	1.02	1.02	25	0.25	3.00	3.25
65		2.9	3.0	0.70	0.30	1.23	1.23	30	0.25	3.00	3.25
70		2.9	3.0	1.17	0.50	1.23	1.23				

\* 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.

## SUMMARY OF ACTUARIAL ASSUMPTIONS

**MSEP - Percent of Eligible Active Members Retiring Next Year | June 30, 2016**

Normal Retirement Pattern					Early Retirement Pattern		
Retirement Age	MSEP and MSEP 2000*			MSEP 2011**	Retirement Age	MSEP*	MSEP 2011**
	Percent Eligible			Percent Eligible		Percent Eligible	Percent Eligible
	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> Year				
48	20%						
49	20	10%					
50	20	10	21%				
51	20	10	21				
52	20	10	21				
53	20	10	21				
54	20	10	21				
55	20	10	21	45%			
56	20	10	21	45			
57	20	10	21	35	57	2.4%	
58	20	10	21	35	58	3.1	
59	20	10	21	30	59	3.0	
60	20	10	21	35	60	5.1	
61	19	10	21	25	61	6.0	
62	18	22	29	40	62	6.0	10%
63	16	18	24	30	63	6.0	10
64	15	17	17	20	64	6.0	10
65	19	19	27	30	65	6.0	50
66	24	25	28	25	66	6.0	50
67	10	25	23	20	67	6.0	
68	20	25	23	20	68	6.0	
69	20	25	23	20	69	6.0	
70	20	25	23	20	70	6.0	
71	20	25	23	20	71	6.0	
72	20	25	23	20	72	6.0	
73	20	25	23	20	73	6.0	
74	20	25	23	20	74	6.0	
75	50	50	23	50	75	6.0	
76	50	50	23	50	76	6.0	
77	75	75	23	75	77	6.0	
78	100	100	100	100	78	6.0	

\* For members hired prior to January 1, 2011.

\*\* For members hired on or after January 1, 2011.

**Elected Official and Legislators — Percent of Active Members Separating Within the Next Year | June 30, 2016**

Years of Service	Withdrawal	Years of Service	Withdrawal
	Men/Women		Men/Women
1	8.0%	5	12.0%
2	8.0	6	12.0
3	8.0	7	12.0
4	8.0	8+	35.0

## SUMMARY OF ACTUARIAL ASSUMPTIONS

## Judicial Plan - Retirement Values | June 30, 2016

Sample Attained Ages	Present Value of \$1/Month the First Year (with 50% Joint & Survivor) Increasing 4.0%/2.0% Yearly		Present Value of \$1/Month the First Year Increasing 2.0% Yearly		Future Life Expectancy (Years)			
	Old Plan COLA		New Plan COLA		Service		Disability	
	Men	Women	Men	Women	Men	Women	Men	Women
40	\$235.59	\$236.34	\$191.85	\$195.44	43.01	45.51	30.97	35.98
45	228.38	229.31	184.72	189.33	38.33	40.84	27.58	32.11
50	219.51	220.52	176.14	181.72	33.77	36.21	24.42	28.40
55	208.76	209.56	166.06	172.38	29.36	31.65	21.43	24.92
60	195.78	196.11	154.26	161.14	25.11	27.22	18.58	21.62
65	180.10	179.73	140.35	147.66	21.01	22.91	15.79	18.30
70	161.44	160.27	124.14	131.84	17.09	18.79	13.04	15.04
75	140.01	137.93	106.03	113.98	13.45	14.93	10.45	12.00
80	116.51	113.61	86.72	94.56	10.17	11.43	8.10	9.34
85	92.52	89.19	67.61	74.92	7.38	8.40	6.08	7.14

## Judicial Plan - Percent of Eligible Active Members Retiring Next Year | June 30, 2016

Normal Retirement Pattern					Early Retirement Pattern		
Retirement Age	Judicial Plan*		Judicial Plan 2011**		Retirement Age	Judicial Plan*	
	Percent Eligible		Percent Eligible			Percent Eligible	
	Men	Women	Men	Women		Men	Women
55	20%	3%					
56	16	3					
57	13	3					
58	9	3					
59	5	3					
60	8	8					
61	5	8					
62	8	8	30%	35%	62	6%	3%
63	10	8	20	20	63	6	3
64	12	8	15	20	64	6	3
65	12	15	30	50	65	6	3
66	20	15	25	25	66	6	3
67	20	15	20	25	67	6	3
68	30	15	20	25	68	6	3
69	30	15	30	50	69	6	3
70	100	100	100	100	70	100	100

\* For members hired prior to January 1, 2011

\*\* For members hired on or after January 1, 2011

## Judicial Plan - Separations From Active Employment Before Service Retirement and Individual Pay Increase Assumptions | June 30, 2016

Sample Ages	Percent of Active Members Separating Within the Next Year				Pay Increase Assumptions for an Individual Employee			Percent of Active Members Separating Within the Next Year		
	Death		Disability		Merit and Seniority	Base (Economy)	Increase Next Year	Withdrawal		
	Men	Women	Men	Women				Service Index	Men	Women
25	0.03%	0.01%	0.01%	0.01%	2.20%	3.00%	5.20%	1	0.040%	0.040%
30	0.03	0.02	0.02	0.01	2.20	3.00	5.20	2	0.010	0.023
35	0.04	0.03	0.03	0.02	1.48	3.00	4.48	3	0.013	0.023
40	0.05	0.04	0.04	0.03	0.76	3.00	3.76	4	0.013	0.023
45	0.07	0.05	0.05	0.04	0.60	3.00	3.60	5	0.013	0.023
50	0.13	0.09	0.08	0.07	0.54	3.00	3.54	6-10	0.013	0.023
55	0.24	0.16	0.13	0.12	0.44	3.00	3.44	11-15	0.017	0.023
60	0.42	0.23	0.20	0.19	0.00	3.00	3.00	16+	0.010	0.010
65	0.74	0.33	0.20	0.19	0.00	3.00	3.00			
70	1.23	0.55	0.20	0.19	0.00	3.00	3.00			

## SUMMARY OF ACTUARIAL ASSUMPTIONS

**Miscellaneous Technical Assumptions | June 30, 2016****Pay Increase Timing**

Beginning of fiscal year.

**Decrement Timing**

Decrements 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.

**Normal Form of Benefit**

The assumed normal form of benefit is the straight life form for MSEP 2000 with 50% continuing to an eligible surviving spouse for MSEP. No adjustment has been made for post-retirement option election changes.

For judges, the assumed normal form of benefit is the straight life form, with 50% continuing to an eligible surviving spouse for members hired prior to January 1, 2011.

**Other Liability Adjustments****Pre-Retirement Survivor Benefits for Spouse of Terminated Vested Member**

The factors used to estimate the cost of immediate unreduced survivor annuities upon the death of a vested member were updated based on prior experience.

Pre-Retirement Survivor Benefits for Spouse of Terminated-Vested Member		
Age	Male	Female
<30	1.57	1.31
30-39	1.24	1.13
40-49	1.09	1.05
>50	1.02	1.01

**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.

**MSEP 2000 Election**

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.

**Service Adjustment**

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

**Marriage Assumption**

It is assumed that, among active members, 70% are married at retirement, 60% of those dying in active service are married, and men are three years older than their spouses.



## SUMMARY OF ACTUARIAL ASSUMPTIONS

### Forfeitures

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.

For judges, vested members are assumed not to take a refund of member contributions and forfeit their benefit upon separation from service.

### Salary and Benefit Limits

For purposes of the valuation, no limits were applied to member compensation or benefits.

The number of active members is assumed to remain constant although certain new hires on or after July 1, 2002, will participate in the Colleges and Universities Retirement Plan. Active and retired member data is reported as of May 31, 2016. It is assumed for valuation purposes that there is no turnover among members and no new entrants during the month of June 2016. New entrant assumed demographic patterns are based on the demographics of active members hired within the last three to eight years.

### Data Adjustments

Active and retired member data was reported as of May 31, 2016. It was brought forward to June 30, 2016, by adding one month of service for all active members and the June COLA for certain retired members. It is expected that this procedure resulted in a slight overstatement of total liabilities as of June 30, 2016. 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 October 1 statutory deadline.

Active members reported with less than a \$100 annualized salary were assumed to receive the average active member pay, which is \$38,805 (\$116,459 for Administrative Law Judges) as of June 30, 2016. There were 25 Regular State Employee members affected by this assumption.

For judges, active members reported with no annualized salary were assumed to receive the average active member pay, which is \$140,738, as of June 30, 2016.

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 the terminated vested members, GRS staff found one member less than what was initially reported. This was confirmed with MOSERS' staff. For members reported with no gender, the member is assumed to be male.

For judges, 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 four years younger for male retirees and four years older for female retirees.

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.

## Actuarial Asset Value Smoothing

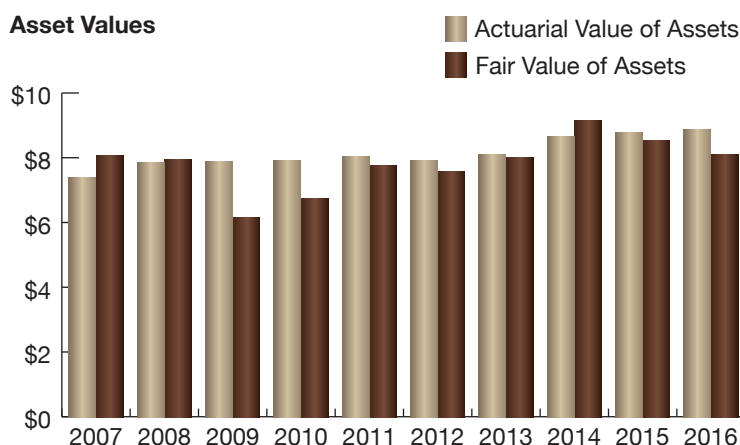
The financing objective of the vast majority of public retirement plans is to establish contribution rates and collect contributions which remain relatively level as a percent of active member payroll over decades of time. This concept is sometimes referred to as attempting to achieve intergenerational equity, meaning future generations will not be expected to pay more or less (in inflation adjusted terms) than the present generation contributes to support the plan.

Some critics of smoothing the actuarial value of assets suggest that pension plans are not providing “transparency” in connection with operations. Actual practice suggests otherwise. The *Statements of Fiduciary Net Position and Changes in Fiduciary Net Position* in the *Financial Section* are prepared on the basis of fair values. Beyond that, all information related to asset values and results of investment activity in the *Investment Section* of this report is prepared on the basis of fair values. This is required by the accounting and reporting standards established by the Governmental Accounting Standards Board and by the Government Finance Officers Association’s *Guidelines for the Preparation of a Comprehensive Annual Financial Report*. Both organizations have been long-standing proponents of transparency in governmental accounting and reporting – public retirement plans commonly subscribe to the dictates of both.

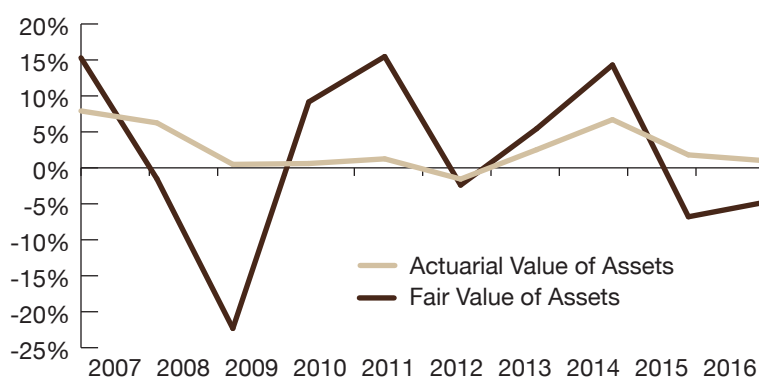
Many public retirement plans have begun to emphasize use of asset classes that, by their nature, tend to be somewhat volatile in fair value. This is being done with the objective of increasing long-term investment returns, thus providing increased benefit security for plan participants and lower contribution rates for taxpayers than would otherwise be the case. With fair value accounting for contribution rate determination purposes, we could achieve more level contribution rates by employing lower volatility asset classes but the level contribution rate would be much higher than is the case with the higher return expectations we have as the result of taking on asset volatility risk.

When operating with a long-term time horizon, with contribution rate stability as a key objective, asset smoothing for actuarial purposes is simply a tool. Asset smoothing for actuarial purposes is a practical solution to responsibly achieving intergenerational equity, giving recognition to the fact that market cycles do not coincide with financial reporting periods. The use of the “market-related” value established through smoothing simply makes more sense for determining contribution rates than using fair value. The charts above further illustrate the impact of smoothing volatility in actuarial computations.

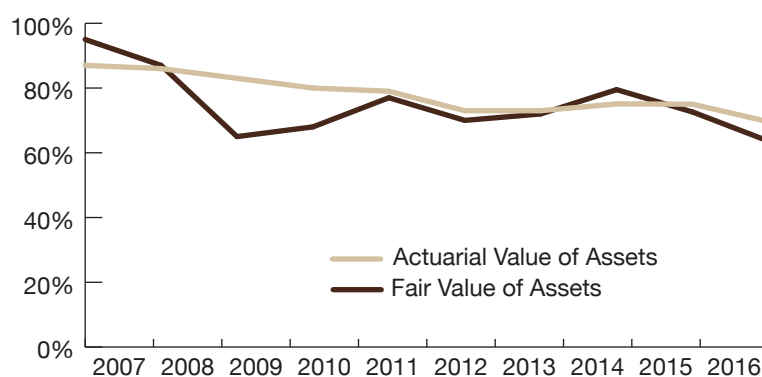
**Asset Values**



**Percent Change in Asset Values**



**Percent Funded**



*Pension Trust Funds***Employer Schedule of Funding Progress | Last Ten Years**

MOSERS uses the entry-age normal funding method. The entry-age normal actuarial cost method 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**

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) Entry Age (b)	Unfunded AAL (UAAL) (b-a)	Percent Funded (a/b)	Annual Covered Payroll (c)	UAAL Percentage of Covered Payroll [(b-a)/c]
6/30/2007	\$7,377,289,283	\$ 8,500,428,641	\$1,123,139,358	86.8%	\$1,846,643,330	60.8%
6/30/2008	7,838,495,768	9,128,347,470	1,289,851,702	85.9	1,916,527,398	67.3
6/30/2009	7,876,079,342	9,494,806,715	1,618,727,373	83.0	2,002,402,087	80.8
6/30/2010	7,923,377,393	9,853,155,445	1,929,778,052	80.4	1,945,095,321	99.2
6/30/2011	8,022,481,408	10,123,544,043	2,101,062,635	79.2	1,875,569,816	112.0
6/30/2012	7,897,167,203	10,793,651,577	2,896,484,374	73.2	1,864,069,493	155.4
6/30/2013	8,096,436,929	11,134,637,484	3,038,200,555	72.7	1,880,212,950	161.6
6/30/2014	8,637,758,955	11,494,571,835	2,856,812,880	75.1	1,902,719,928	150.1
6/30/2015	8,792,485,658	11,727,618,410	2,935,132,752	75.0	1,918,527,768	153.0
6/30/2016	8,878,057,191	12,751,162,753	3,873,105,562	69.6	1,921,528,936	201.6

**Judicial Plan**

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) Entry Age (b)	Unfunded AAL (UAAL) (b-a)	Percent Funded (a/b)	Annual Covered Payroll (c)	UAAL Percentage of Covered Payroll [(b-a)/c]
6/30/2007	\$ 61,903,516	\$326,666,373	\$264,762,857	19.0%	\$40,846,581	648.2%
6/30/2008	73,194,379	354,796,453	281,602,074	20.6	44,542,530	632.2
6/30/2009	81,337,881	369,106,841	287,768,960	22.0	45,505,512	632.4
6/30/2010	88,976,738	382,012,773	293,036,035	23.3	46,112,730	635.5
6/30/2011	98,398,628	393,484,589	295,085,961	25.0	45,888,020	643.1
6/30/2012	102,266,706	413,332,538	311,065,832	24.7	45,835,501	678.7
6/30/2013	111,140,339	435,378,358	324,238,019	25.5	48,697,726	665.8
6/30/2014	124,269,105	462,336,255	338,067,150	26.9	49,587,936	681.8
6/30/2015	134,349,908	482,969,311	348,619,403	27.8	55,656,457	626.4
6/30/2016	143,468,860	547,621,617	404,152,757	26.2	57,421,016	703.8

See *Required Notes to the Schedules of Supplementary Information*.

See accompanying *Independent Auditors' Report*.

*Pension Trust Funds***Summary of Member Data Included in Valuations | June 30, 2016****Active Members**

Valuation Group	Number	Payroll	Group Averages		
			Salary	Age (Yrs.)	Service (Yrs.)
<b>MSEP</b>					
Regular state employees	46,652	\$1,760,954,416	\$ 37,747	45.2	10.8
Elected officials	6	659,977	109,996	47.7	8.7
Legislative clerks	17	637,809	37,518	62.4	23.0
Legislators	194	6,978,820	35,973	52.7	5.1
Uniformed water patrol	11	721,310	65,574	40.7	15.1
Conservation department	1,371	59,149,578	43,143	44.5	14.2
School-term salaried employees	1,186	89,282,632	75,280	57.4	21.6
Administrative law judges	27	3,144,394	116,459	58.8	21.9
Total MSEP group	49,464	\$1,921,528,936	\$ 38,847	45.5	11.2
<b>Judicial Plan</b>	408	\$ 57,421,016	\$140,738	56.7	12.0

**Retired Lives**

Type of Benefit Payment	Number	Annual Benefits	Group Averages	
			Benefit	Age (Yrs.)
<b>MSEP</b>				
Retirement	39,799	\$623,139,988	\$15,657	69.7
Disability	4	14,640	3,660	63.0
Survivor of active member	1,658	17,580,693	10,604	62.4
Survivor of retired member	3,367	40,079,686	11,904	75.3
Total MSEP group	44,828	\$680,815,007	\$15,187	69.9
<b>Judicial Plan</b>	540	\$ 33,189,832	\$61,463	75.8

**Others**

Group	Terminated-Vested	Leave of Absence	Long-Term Disability
MSEP	19,512	132	928
Judicial Plan	26	0	1

**Active Members by Attained Age and Years of Service | June 30, 2016****MSEP**

Attained Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
15-19	94							94	\$ 2,396,533
20-24	2,049	6						2,055	57,822,351
25-29	4,035	546	14					4,595	148,984,633
30-34	2,742	1,647	498	17				4,904	174,216,818
35-39	2,027	1,409	1,374	543	16			5,369	202,764,305
40-44	1,562	1,127	1,108	1,446	425	20		5,688	221,426,491
45-49	1,523	1,052	990	1,402	1,210	476	58	6,711	269,296,848
50-54	1,409	1,060	1,070	1,320	1,080	998	473	7,410	304,709,083
55-59	1,119	956	950	1,302	934	732	596	6,589	272,173,222
60	194	181	197	237	144	107	101	1,161	48,331,660
61	148	144	181	207	148	107	72	1,007	43,851,427
62	113	152	128	181	98	82	67	821	35,480,883
63	94	113	111	156	94	75	57	700	30,390,857
64	75	93	117	145	85	55	84	654	29,129,971
65	41	72	83	92	72	37	72	469	21,052,309
66	39	67	66	66	36	29	41	344	16,170,991
67	22	47	36	44	26	22	26	223	10,418,013
68	14	36	43	37	20	14	23	187	9,127,311
69	18	33	26	34	12	15	19	157	7,861,704
70+	35	51	59	55	52	24	50	326	15,923,526
Totals	17,353	8,792	7,051	7,284	4,452	2,793	1,739	49,464	\$1,921,528,936

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

Group Averages: Age — 45.5 years • Service — 11.2 years • Annual pay — \$38,847

**Judicial Plan**

Attained Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
30-34	3							3	\$ 404,841
35-39	11	3						14	1,902,279
40-44	14	9						23	3,147,060
45-49	16	17	13	3				49	6,717,896
50-54	22	19	7	12	4			64	9,004,582
55-59	26	27	8	25	11	2		99	13,921,102
60		1	1	2	3	3	1	11	1,607,823
61	2	6	3	3	3	1	1	19	2,661,687
62	2	5	1	2	6	6	2	24	3,471,439
63	2	5	2	1	5	1	2	18	2,556,053
64	1	3	3	7	4	1		19	2,728,962
65	2	2	3	2	1		2	12	1,682,881
66		2	5	4	1	3	1	16	2,273,658
67			3	3	1		2	9	1,288,528
68		4		6	5	2	1	18	2,623,156
69		3		2	3	1	1	10	1,429,069
Totals	101	106	49	72	47	20	13	408	\$57,421,016

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

Group Averages: Age — 56.7 years • Service — 12.0 years • Annual pay — \$140,738



## Schedules of Active Member Valuation Data | Ten Years Ended June 30, 2016

### MSEP

Schedule of Active Member Valuation Data				
Valuation Date	Number	Annual Payroll	Annual Average Pay	% Increase in Average Pay
June 30, 2007	54,363	\$1,846,643,330	\$33,969	4.15%
June 30, 2008	54,542	1,916,527,398	35,139	3.44
June 30, 2009	55,057	2,002,402,087	36,370	3.50
June 30, 2010	53,478	1,945,095,321	36,372	0.01
June 30, 2011	51,660	1,875,569,816	36,306	(0.18)
June 30, 2012	51,332	1,864,069,493	36,314	0.02
June 30, 2013	50,833	1,880,212,950	36,988	1.86
June 30, 2014	50,621	1,902,719,928	37,588	1.62
June 30, 2015	49,980	1,918,527,768	38,386	2.12
June 30, 2016	49,464	1,921,528,936	38,847	1.20

### Judicial Plan

Schedule of Active Member Valuation Data				
Valuation Date	Number	Annual Payroll	Annual Average Pay	% Increase in Average Pay
June 30, 2007	400	\$40,846,581	\$102,116	(0.09)%
June 30, 2008	401	44,542,530	111,079	8.78
June 30, 2009	397	45,505,512	114,623	3.19
June 30, 2010	402	46,112,730	114,708	0.07
June 30, 2011	399	45,888,020	115,008	0.26
June 30, 2012	398	45,835,501	115,165	0.14
June 30, 2013	400	48,697,726	121,744	5.71
June 30, 2014	405	49,587,936	122,439	0.57
June 30, 2015	405	55,656,457	137,423	12.24
June 30, 2016	408	57,421,016	140,738	2.41

# Retirees and Beneficiaries Added and Removed | Ten Years Ended June 30, 2016\*

## MSEP

			Added to Rolls		Removed from Rolls	
Fiscal Year Ended	Classification	Benefit Type	Number	Annual Allowances	Number	Annual Allowances
June 30, 2009	General employees	Retirement	2,195	\$37,338,992	852	\$9,903,887
		Survivor of active	82	996,258	54	390,167
		Survivor of retired	251	3,077,466	110	827,564
		Disability	0	876	1	4,237
	Lincoln University - vested	Retirement	0	0	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	21	746,414	8	120,396
		Survivor of active	0	5,137	1	14,128
		Survivor of retired	4	84,108	2	20,473
	Elected officials	Retirement	2	105,141	0	0
		Survivor of active	0	2,997	0	0
		Survivor of retired	0	1,274	0	0
ALJs	Retirement	3	168,517	2	90,337	
	Survivor of retired	2	57,238	1	27,354	
June 30, 2010	General employees	Retirement	2,298	34,755,192	833	9,979,318
		Survivor of active	83	1,054,292	49	276,401
		Survivor of retired	246	3,080,424	117	1,078,265
		Disability	0	830	1	2,985
	Lincoln University - vested	Retirement	1	5,671	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	12	201,562	12	239,880
		Survivor of active	0	3,975	1	16,709
		Survivor of retired	5	78,765	0	0
	Elected officials	Retirement	0	0	1	66,911
		Survivor of active	0	3,117	0	0
		Survivor of retired	1	34,780	0	0
	ALJs	Retirement	3	113,877	1	46,794
		Survivor of active	0	0	0	0
		Survivor of retired	0	7,332	0	0
June 30, 2011	General employees	Retirement	2,850	41,203,358	892	10,670,476
		Survivor of active	65	914,689	46	261,503
		Survivor of retired	298	3,059,195	176	1,670,990
		Disability	0	79	1	1,732
	Lincoln University - vested	Retirement	1	1,780	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	41	601,171	10	185,635
		Survivor of active	0	2,903	1	19,612
		Survivor of retired	5	73,841	2	16,628
	Elected officials	Retirement	0	0	0	0
		Survivor of active	0	3,242	0	0
		Survivor of retired	0	1,053	0	0
	ALJs	Retirement	4	212,519	0	0
		Survivor of active	0	0	0	0
		Survivor of retired	0	2,599	1	27,724
June 30, 2012	General employees	Retirement	2,637	39,423,910	895	11,116,063
		Survivor of active	82	1,129,634	34	197,452
		Survivor of retired	282	3,665,503	158	1,416,283
		Disability	0	458	0	0
	Lincoln University - vested	Retirement	0	0	2	11,032
		Survivor of active	0	0	0	0
	Legislators	Retirement	13	229,979	8	139,545
		Survivor of active	0	3,531	0	0
		Survivor of retired	4	80,142	3	52,550
	Elected officials	Retirement	2	86,431	0	0
		Survivor of active	0	3,371	0	0
		Survivor of retired	0	1,336	0	0
	ALJs	Retirement	3	124,248	3	158,072
		Survivor of active	1	25,592	0	0
		Survivor of retired	2	57,704	0	0

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

Source of Data: MOSERS benefit payment database as of June 30, 2016.  
Other Actuarial Section information reported based on MOSERS data as of May 31, 2016.

Rolls at End of Year				
Number	Annual Allowances	Percentage Increase (Decrease) in Annual Allowances	Average Annual Allowances	Percentage Increase (Decrease) in Average Annual Allowances
27,942	\$425,200,398	6.90%	\$15,217	1.76%
1,364	12,095,246	5.28	8,867	3.10
2,259	22,538,130	11.09	9,977	4.15
10	33,055	(9.23)	3,306	(0.15)
13	55,953	0.00	4,304	0.00
1	2,624	0.00	2,624	0.00
262	5,207,953	13.66	19,878	8.03
13	146,210	(5.79)	11,247	1.45
56	771,979	8.98	13,785	5.09
14	620,135	20.42	44,295	3.21
1	77,924	4.00	77,924	4.00
1	33,117	4.00	33,117	4.00
26	1,177,522	7.11	45,289	2.99
11	275,852	12.15	25,077	1.95
29,407	449,976,272	5.83	15,302	0.56
1,398	12,873,137	6.43	9,208	3.85
2,388	24,540,289	8.88	10,277	3.01
9	30,900	(6.52)	3,433	3.84
14	61,624	10.14	4,402	2.28
1	2,624	0.00	2,624	0.00
262	5,169,635	(0.74)	19,731	(0.74)
12	133,476	(8.71)	11,123	(1.10)
61	850,744	10.20	13,947	1.18
13	553,224	(10.79)	42,556	(3.93)
1	81,041	4.00	81,041	4.00
2	67,897	105.02	33,949	2.51
28	1,244,605	5.70	44,450	(1.85)
0	0	0.00	0	0.00
11	283,184	2.66	25,744	2.66
31,365	480,509,154	6.79	15,320	0.12
1,417	13,526,323	5.07	9,546	3.67
2,510	25,928,494	5.66	10,330	0.52
8	29,247	(5.35)	3,656	6.50
15	63,404	2.89	4,227	(3.98)
1	2,624	0.00	2,624	0.00
293	5,585,171	8.04	19,062	(3.39)
11	116,767	(12.52)	10,615	(4.57)
64	907,957	6.73	14,187	1.72
13	553,224	0.00	42,556	0.00
1	84,283	4.00	84,283	4.00
2	68,950	1.55	34,475	1.55
32	1,457,124	17.08	45,535	2.44
0	0	0.00	0	0.00
10	258,059	(8.87)	25,806	0.24
33,107	508,817,001	5.89	15,369	0.32
1,465	14,458,505	6.89	9,869	3.38
2,634	28,177,714	8.67	10,698	3.56
8	29,705	1.57	3,713	1.56
13	52,372	(17.40)	4,029	(4.68)
1	2,624	0.00	2,624	0.00
298	5,675,605	1.62	19,046	(0.08)
11	120,298	3.02	10,936	3.02
65	935,549	3.04	14,393	1.45
15	639,655	15.62	42,644	0.21
1	87,654	4.00	87,654	4.00
2	70,286	1.94	35,143	1.94
32	1,423,300	(2.32)	44,478	(2.32)
1	25,592	0.00	25,592	0.00
12	315,763	22.36	26,314	1.97

Retirees and Beneficiaries Added and Removed continued on pages 106-107.

Retirees and Beneficiaries Added and Removed continued from pages 104-105.

## MSEP

Fiscal Year Ended	Classification	Benefit Type	Added to Rolls		Removed from Rolls	
			Number	Annual Allowances	Number	Annual Allowances
June 30, 2013	General employees	Retirement	2,632	\$40,416,533	983	\$12,869,826
		Survivor of active	97	1,080,366	64	400,983
		Survivor of retired	323	4,085,887	150	1,363,799
		Disability	0	696	1	3,854
	Lincoln University - vested	Retirement	2	5,980	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	37	442,937	15	320,292
		Survivor of active	0	3,851	0	0
		Survivor of retired	9	176,283	6	88,725
	Elected officials	Retirement	1	53,873	0	0
		Survivor of active	0	3,506	0	0
		Survivor of retired	0	1,458	0	0
	ALJs	Retirement	4	233,124	2	111,466
		Survivor of active	0	1,024	0	0
		Survivor of retired	2	65,892	1	22,759
June 30, 2014	General employees	Retirement	2,612	37,411,991	944	12,205,892
		Survivor of active	90	1,095,464	34	262,401
		Survivor of retired	324	3,954,360	157	1,504,423
		Disability	0	408	2	7,391
	Lincoln University - vested	Retirement	0	0	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	18	239,904	7	95,748
		Survivor of active	0	3,680	0	0
		Survivor of retired	5	39,520	5	44,445
	Elected officials	Retirement	0	0	1	19,605
		Survivor of active	0	2,788	0	0
		Survivor of retired	1	10,811	0	0
	ALJs	Retirement	1	50,072	2	78,138
		Survivor of active	1	27,358	0	0
		Survivor of retired	0	7,404	1	30,930
June 30, 2015	General employees	Retirement	2,865	43,527,132	1,061	13,940,436
		Survivor of active	111	1,160,798	56	434,928
		Survivor of retired	350	4,399,848	180	1,673,736
		Disability	0	180	1	5,220
	Lincoln University - vested	Retirement	1	2,340	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	16	236,916	4	130,116
		Survivor of active	0	3,432	1	15,180
		Survivor of retired	3	61,956	9	79,944
	Elected officials	Retirement	0	0	0	0
		Survivor of active	1	15,802	0	0
		Survivor of retired	0	0	0	0
	ALJs	Retirement	3	128,952	0	0
		Survivor of active	0	1,452	0	0
		Survivor of retired	0	6,612	0	0
June 30, 2016	General employees	Retirement	2,815	40,917,948	1,147	15,381,612
		Survivor of active	101	1,023,096	56	377,484
		Survivor of retired	365	4,493,892	222	2,073,192
		Disability	0	108	0	0
	Lincoln University - vested	Retirement	1	3,444	1	3,936
		Survivor of active	0	0	0	0
	Legislators	Retirement	8	107,412	15	427,428
		Survivor of active	0	3,084	0	0
		Survivor of retired	7	173,760	3	50,448
	Elected officials	Retirement	0	0	0	0
		Survivor of active	0	0	0	0
		Survivor of retired	0	0	0	0
	ALJs	Retirement	5	230,472	2	150,888
		Survivor of active	0	1,176	0	0
		Survivor of retired	2	84,588	2	62,220

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

Source of Data: MOSERS benefit payment database as of June 30, 2016.  
Other Actuarial Section information reported based on MOSERS data as of May 31, 2016.

Rolls at End of Year		Percentage Increase (Decrease)	Average Annual	Percentage Increase (Decrease)
Number	Annual Allowances	in Annual Allowances	Allowances	in Average Annual Allowances
34,756	\$536,363,708	5.41%	\$15,432	0.41%
1,498	15,137,889	4.70	10,105	2.39
2,807	30,899,802	9.66	11,008	2.90
7	26,546	(10.63)	3,792	2.13
15	58,351	11.42	3,890	(3.45)
1	2,623	(0.04)	2,623	(0.04)
320	5,798,251	2.16	18,120	(4.86)
11	124,149	3.20	11,286	3.20
68	1,023,107	9.36	15,046	4.54
16	693,528	8.42	43,346	1.65
1	91,160	4.00	91,160	4.00
2	71,744	2.07	35,872	2.07
34	1,544,957	8.55	45,440	2.16
1	26,615	4.00	26,615	4.00
13	358,896	13.66	27,607	4.91
36,424	561,569,807	4.70	15,418	(0.09)
1,554	15,970,952	5.50	10,277	1.70
2,974	33,349,739	7.93	11,214	1.87
5	19,563	(26.31)	3,913	3.19
15	58,351	0.00	3,890	0.00
1	2,623	0.00	2,623	0.00
331	5,942,407	2.49	17,953	(0.92)
11	127,829	2.96	11,621	2.97
68	1,018,182	(0.48)	14,973	(0.49)
15	673,923	(2.83)	44,928	3.65
1	93,948	3.06	93,948	3.06
3	82,555	15.07	27,518	(23.29)
33	1,516,891	(1.82)	45,966	1.16
2	53,973	102.79	26,987	1.40
12	335,370	(6.56)	27,948	1.24
38,227	591,156,503	5.27	15,464	0.30
1,608	16,696,822	4.54	10,384	1.04
3,144	36,075,851	8.17	11,475	2.33
4	14,523	(25.76)	3,631	(7.21)
16	60,691	4.01	3,793	(2.49)
1	2,623	0.00	2,623	0.00
339	6,049,207	1.80	17,844	(0.61)
10	116,081	(9.19)	11,608	(0.11)
66	1,000,194	(1.77)	15,154	1.21
15	673,923	0.00	44,928	0.00
2	109,750	16.82	54,875	(41.59)
3	82,555	0.00	27,518	0.00
36	1,645,843	8.50	45,718	(0.54)
2	55,425	2.69	27,713	2.69
12	341,982	1.97	28,499	1.97
39,895	616,692,839	4.32	15,458	(0.04)
1,653	17,342,434	3.87	10,491	1.03
3,287	38,496,551	6.71	11,712	2.07
4	14,631	0.74	3,658	0.74
16	60,199	(0.81)	3,762	(0.82)
1	2,623	0.00	2,623	0.00
332	5,729,191	(5.29)	17,257	(3.29)
10	119,165	2.66	11,917	2.66
70	1,123,506	12.33	16,050	5.91
15	673,923	0.00	44,928	0.00
2	109,750	0.00	54,875	0.00
3	82,555	0.00	27,518	0.00
39	1,725,427	4.84	44,242	(3.23)
2	56,601	2.12	28,301	2.12
12	364,350	6.54	30,363	6.54



**Retirees and Beneficiaries Added and Removed | Ten Years Ended June 30, 2016\*****Judicial Plan**

Fiscal Year Ended	Benefit Type	Added to Rolls		Removed from Rolls	
		Number	Annual Allowances	Number	Annual Allowances
June 30, 2009	Retirement	30	\$1,922,615	15	\$ 957,943
	Survivor of active	1	59,484	0	0
	Survivor of retired	9	418,266	2	61,344
June 30, 2010	Retirement	12	1,137,305	13	750,021
	Survivor of active	0	32,700	2	32,399
	Survivor of retired	11	436,312	5	130,920
June 30, 2011	Retirement	36	2,501,248	9	563,214
	Survivor of active	0	14,893	1	35,792
	Survivor of retired	4	167,535	9	206,465
June 30, 2012	Retirement	18	1,490,554	14	1,074,572
	Survivor of active	0	22,717	0	0
	Survivor of retired	8	371,622	6	218,310
June 30, 2013	Retirement	27	2,233,387	13	851,802
	Survivor of active	0	28,591	1	33,778
	Survivor of retired	8	355,101	10	288,980
June 30, 2014	Retirement	18	1,671,667	8	443,807
	Survivor of active	2	66,272	0	0
	Survivor of retired	5	254,117	7	216,813
June 30, 2015	Retirement	39	3,599,880	21	1,395,888
	Survivor of active	0	34,344	0	0
	Survivor of retired	18	705,444	5	198,348
June 30, 2016	Retirement	16	1,671,084	14	1,078,356
	Survivor of active	0	15,072	1	43,032
	Survivor of retired	8	368,868	10	354,144

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

Rolls at End of Year		Percentage Increase (Decrease) in Annual Allowances	Average Annual Allowances	Percentage Increase (Decrease) in Average Annual Allowances
Number	Annual Allowances			
326	\$19,624,545	5.17%	\$60,198	0.33%
37	1,056,425	5.97	28,552	3.10
103	3,139,829	12.83	30,484	5.16
325	20,011,829	1.97	61,575	2.29
35	1,056,726	0.03	30,192	5.74
109	3,445,221	9.73	31,608	3.69
352	21,949,863	9.68	62,358	1.27
34	1,035,827	(1.98)	30,466	0.91
104	3,406,291	(1.13)	32,753	3.62
356	22,365,845	1.90	62,825	0.75
34	1,058,544	2.19	31,134	2.19
106	3,559,603	4.50	33,581	2.53
370	23,747,431	6.18	64,182	2.16
33	1,053,358	(0.49)	31,920	2.52
104	3,625,723	1.86	34,863	3.82
380	24,975,291	5.17	65,724	2.40
35	1,119,630	6.29	31,989	0.22
102	3,663,027	1.03	35,912	3.01
398	25,951,423	9.28	65,205	1.59
35	1,087,702	3.26	31,077	(2.64)
115	4,132,819	13.99	35,938	3.08
400	26,544,151	2.28	66,360	1.77
34	1,059,742	(2.57)	31,169	0.30
113	4,147,543	0.36	36,704	2.13

## Short-Term Solvency Test | Ten Years Ended June 30, 2016

## MSEP

Fiscal Year	Actuarial Accrued Liabilities for				Percentage of Actuarial Liabilities Covered by Actuarial Value of Assets Available for		
	Member Contributions	Current Retirees and Beneficiaries	Active and Inactive Members, Employer Financed Portion	Actuarial Value of Assets Available for Benefits	(1)	(2)	(3)
	(1)	(2)	(3)				
2007	\$ 0	\$4,208,621,537	\$4,291,807,104	\$7,377,289,283	100.0%	100.0%	73.8%
2008	0	4,408,682,437	4,719,665,033	7,838,495,768	100.0	100.0	72.7
2009	0	4,737,859,976	4,756,946,739	7,876,079,342	100.0	100.0	66.0
2010	0	5,012,677,769	4,840,477,676	7,923,377,393	100.0	100.0	60.1
2011	67,126	5,357,794,617	4,765,682,300	8,022,481,408	100.0	100.0	55.9
2012	706,422	5,749,411,068	5,043,534,087	7,897,167,203	100.0	100.0	42.6
2013	1,504,901	6,062,654,441	5,070,478,142	8,096,436,929	100.0	100.0	40.1
2014	2,133,130	6,347,728,717	5,144,706,988	8,637,758,955	100.0	100.0	44.5
2015	2,452,605	6,695,631,737	5,029,504,068	8,792,485,658	100.0	100.0	41.6
2016	1,776,133	7,305,895,284	5,443,491,336	8,878,057,191	100.0	100.0	28.8

## Judicial Plan

Fiscal Year	Actuarial Accrued Liabilities for				Percentage of Actuarial Liabilities Covered by Actuarial Value of Assets Available for		
	Member Contributions	Current Retirees and Beneficiaries	Active and Inactive Members, Employer Financed Portion	Actuarial Value of Assets Available for Benefits	(1)	(2)	(3)
	(1)	(2)	(3)				
2007	\$ 0	\$199,489,503	\$127,176,870	\$ 61,903,516	100.0%	31.0%	0.0%
2008	0	216,369,879	138,426,574	73,194,379	100.0	33.8	0.0
2009	0	231,505,591	137,601,250	81,337,881	100.0	35.1	0.0
2010	0	236,113,077	145,899,696	88,976,738	100.0	37.7	0.0
2011	284	251,532,354	141,951,951	98,398,628	100.0	39.1	0.0
2012	795	258,642,149	154,689,594	102,266,706	100.0	39.5	0.0
2013	2,924	274,911,416	160,464,018	111,140,339	100.0	40.4	0.0
2014	5,717	285,124,436	177,206,102	124,269,105	100.0	43.6	0.0
2015	8,691	316,042,514	166,918,106	134,349,908	100.0	42.5	0.0
2016	4,933	354,715,048	192,901,636	143,468,860	100.0	40.4	0.0

## Analysis of Financial Experience | Year Ended June 30, 2016

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

	\$ Millions	Valuation Date June 30	Actuarial Gain (Loss) as a % of Beginning Accrued Liabilities
Unfunded actuarial accrued liability (UAAL) at beginning of year	\$2,935.1	2007	1.0
Normal cost from last valuation	157.5	2008	0.1
Actual employer contributions	(356.5)	2009	(5.2)
Interest accrual	226.8	2010	(4.0)
Expected UAAL before changes	2,962.9	2011	(2.4)
Change from any changes in benefits, assumptions, or methods	528.8	2012	(4.7)
Expected UAAL after changes	3,491.7	2013	(2.8)
Less: Actual UAAL at end of year	3,872.8	2014	2.1
Gain (loss)	<u>\$ (381.1)</u>	2015	(0.9)
Gain (loss) as a percent of actuarial accrued liabilities at start of year (\$11,727)	(3.2)%	2016	(3.2)

### Judicial Plan

	\$ Millions	Valuation Date June 30	Actuarial Gain (Loss) as a % of Beginning Accrued Liabilities
Unfunded actuarial accrued liability (UAAL) at beginning of year	\$348.6	2007	(0.6)
Normal cost from last valuation	11.1	2008	(3.0)
Actual employer contributions	(34.3)	2009	(1.8)
Interest accrual	26.9	2010	(1.1)
Expected UAAL before changes	352.3	2011	(0.4)
Change from any changes in benefits, assumptions, or methods	52.1	2012	(0.6)
Expected UAAL after changes	404.4	2013	(2.6)
Less: Actual UAAL at end of year	404.1	2014	1.5
Gain (loss)	<u>\$ 0.3</u>	2015	(1.5)
Gain (loss) as a percent of actuarial accrued liabilities at start of year (\$483)	0.1%	2016	0.1

## Comparison of Plans for General State Employees | June 30, 2016

## MSEP • MSEP 2000 • MSEP 2011

Benefit Provisions	MSEP
Membership eligibility	<ul style="list-style-type: none"> <li>Members who work in a permanent position normally requiring at least 1,040 hours of work a year.</li> </ul>
Vesting	<ul style="list-style-type: none"> <li>5 years</li> </ul>
Base benefit formula	<ul style="list-style-type: none"> <li><math>.016 \times \text{FAP} \times \text{service}</math> <i>In the past, formula increases have been passed along to MSEP retirees.</i></li> </ul>
Temporary benefit formula	<ul style="list-style-type: none"> <li>Not available</li> </ul>
Benefit payment options	<ul style="list-style-type: none"> <li>Life income annuity</li> <li>Unreduced joint &amp; 50% survivor</li> <li>Joint &amp; 100% survivor</li> <li>Life income with 60 guaranteed payments</li> <li>Life income with 120 guaranteed payments</li> </ul>
Cost-of-living adjustment (COLA)	<ul style="list-style-type: none"> <li>If hired before August 28, 1997, will receive 4-5% each year until reaching the 65% cap. After COLA cap, the rate is based on 80% of the percentage increase in the CPI (0-5%).</li> <li>If hired on or after August 28, 1997, annual COLA will be based on 80% of the percentage increase in the CPI (0-5%).</li> </ul>
Normal retirement eligibility	<ul style="list-style-type: none"> <li>Age 65 with 5 years of service</li> <li>Age 60 with 15 years of service</li> <li>"Rule of 80" - at least age 48 with age and service equaling 80 or more</li> <li><i>Age 50 if first became eligible prior to August 28, 2003</i></li> </ul>
Early retirement eligibility	<ul style="list-style-type: none"> <li>Age 55 with 10 years of service</li> <li><i>Base benefit will be reduced <math>\frac{1}{2}</math> of 1% (.005) for each month member's age is younger than normal retirement.</i></li> </ul>
Death before retirement	<ul style="list-style-type: none"> <li>Non duty-related death (<i>vested members</i>) <ul style="list-style-type: none"> <li>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.</li> </ul> </li> <li>Duty-related death (<i>no minimum service requirement</i>). <ul style="list-style-type: none"> <li>Survivor benefit to eligible spouse or children no less than 50% of average compensation.</li> </ul> </li> </ul>
In-service COLA	<ul style="list-style-type: none"> <li>COLA given for service beyond age 65. COLA provisions are determined by employment date.</li> </ul>
BackDROP	<ul style="list-style-type: none"> <li>Must work at least 2 years beyond normal retirement eligibility to be eligible for BackDROP.</li> </ul>
Service purchases	<ul style="list-style-type: none"> <li>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.</li> </ul>
Service transfers	<ul style="list-style-type: none"> <li>May transfer state service to other positions covered by MOSERS under 104.800.</li> </ul>
Member contributions	<ul style="list-style-type: none"> <li>None</li> </ul>

## MSEP 2000

- Members hired 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 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.
  - 5 years
  - .017 x FAP x service  
*Future formula increases, if any, will not be passed along to retirees.*
  - .008 x FAP x 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 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 ½ 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

- Members hired for the first time on or after January 1, 2011, in a permanent position normally requiring at least 1,040 hours of work a year.
  - 10 years
  - .017 x FAP x service  
*Future formula increases, if any, will not be passed along to retirees.*
  - .008 x FAP x 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 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 ½ 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
  - Not available
  - May purchase qualifying public sector service at full actuarial cost.
  - Not available
  - 4% of pay



## Comparison of Plans for Legislators | June 30, 2016

## MSEP • MSEP 2000 • MSEP 2011

Benefit Provisions	MSEP
Membership eligibility	<ul style="list-style-type: none"> <li>Elected to the General Assembly</li> </ul>
Vesting	<ul style="list-style-type: none"> <li>3 full-biennial assemblies (6 years)</li> </ul>
Base benefit formula	<ul style="list-style-type: none"> <li>Biennial assemblies x \$150</li> <li><i>In the past, formula increases have been passed along to MSEP retirees.</i></li> </ul>
Temporary benefit formula	<ul style="list-style-type: none"> <li>Not available</li> </ul>
Benefit payment options	<ul style="list-style-type: none"> <li>Life income annuity</li> <li><i>Unreduced</i> joint &amp; 50% survivor</li> <li>Joint &amp; 100% survivor</li> <li>Life income with 60 guaranteed payments</li> <li>Life income with 120 guaranteed payments</li> </ul>
Cost-of-living adjustment (COLA)	<ul style="list-style-type: none"> <li>If sworn in before August 28, 1997, will receive 4-5% each year until reaching 65% cap. After COLA cap, the rate is based on 80% of the percentage increase in the CPI (0-5%).</li> <li>If sworn in on or after August 28, 1997, COLA will be based on 80% of the percentage increase in the CPI (0-5%).</li> </ul>
Normal retirement eligibility	<ul style="list-style-type: none"> <li>Age 55 with 3 full-biennial assemblies or</li> <li>"Rule of 80" — at least age 48 with age and service equaling 80 or more</li> </ul>
Early retirement eligibility	<ul style="list-style-type: none"> <li>Not available</li> </ul>
Death before retirement	<ul style="list-style-type: none"> <li>Non duty-related death (<i>vested members</i>) <ul style="list-style-type: none"> <li>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.</li> </ul> </li> <li>Duty-related death (<i>no minimum service requirement</i>) <ul style="list-style-type: none"> <li>Survivor benefit to eligible spouse or children no less than 50% of the rate of compensation.</li> </ul> </li> </ul>
In-service COLA	<ul style="list-style-type: none"> <li>COLA given for service beyond age 65. COLA provisions are determined by employment date.</li> </ul>
BackDROP	<ul style="list-style-type: none"> <li>Not available</li> </ul>
Service purchases	<ul style="list-style-type: none"> <li>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.</li> </ul>
Service transfers	<ul style="list-style-type: none"> <li>May transfer state service to other positions covered by MOSERS under 104.800.</li> </ul>
Member contributions	<ul style="list-style-type: none"> <li>None</li> </ul>

## MSEP 2000

- Elected to the General Assembly 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  
*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
  - "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 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 on or after January 1, 2011
  - 3 full-biennial assemblies (6 years)
  - (Active legislator's pay ÷ 24) x service  
*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
  - "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 rate of compensation.
  - Not available
- 
- Not available
  - May purchase qualifying public sector service at full actuarial cost.
  - Not available
  - 4% of pay

## Comparison of Plans for Statewide Elected Officials | June 30, 2016

## MSEP • MSEP 2000 • MSEP 2011

Benefit Provisions	MSEP
Membership eligibility	<ul style="list-style-type: none"> <li>• Elected to state office</li> </ul>
Vesting	<ul style="list-style-type: none"> <li>• 4 years (1 term)</li> </ul>
Base benefit formula	<ul style="list-style-type: none"> <li>• Less than 12 years of service FAP x .016 x service</li> <li>• 12 or more years of service Monthly statutory compensation x .50 <i>In the past, formula increases have been passed along to MSEP retirees.</i></li> </ul>
Temporary benefit formula	<ul style="list-style-type: none"> <li>• Not available</li> </ul>
Benefit payment options	<ul style="list-style-type: none"> <li>• Life income annuity</li> <li>• <i>Unreduced</i> joint &amp; 50% survivor</li> <li>• Joint &amp; 100% survivor</li> <li>• Life income with 60 guaranteed payments</li> <li>• Life income with 120 guaranteed payments</li> </ul>
Cost-of-living adjustment (COLA)	<ul style="list-style-type: none"> <li>• Less than 12 years of service <ul style="list-style-type: none"> <li>– Statewide elected officials sworn in before August 28, 1997 will receive 4-5% each year until they reach 65% cap. After COLA cap, the rate is based on 80% of the percentage increase in the CPI (0-5%).</li> <li>– Statewide elected officials sworn in between August 28, 1997 and June 30, 2000, will receive a COLA equal to 80% of percentage increase in the CPI (0-5%).</li> </ul> </li> <li>• 12 or more years of service <ul style="list-style-type: none"> <li>– Statewide elected officials with 12 or more years of service will receive a COLA based on increases in statutory compensation for the highest position held.</li> <li>– Statewide elected officials sworn in before August 28, 1997 will receive 4-5% each year until they reach 65% cap. After COLA cap, the rate is based on 80% of the percentage increase in the CPI (0-5%).</li> <li>– Statewide elected officials sworn in between August 28, 1997 and June 30, 2000, will receive a COLA equal to 80% of percentage increase in the CPI (0-5%).</li> </ul> </li> </ul>
Normal retirement eligibility	<ul style="list-style-type: none"> <li>• Age 60 with 15 years of service or</li> <li>• “Rule of 80” — at least age 50 with age and service equaling 80 or more</li> </ul>
Early retirement eligibility	<ul style="list-style-type: none"> <li>• Age 55 with 10 years of service</li> </ul>
Death before retirement	<ul style="list-style-type: none"> <li>• Non duty-related death (<i>vested members</i>) <ul style="list-style-type: none"> <li>– 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.</li> </ul> </li> <li>• Duty-related death (<i>no minimum service requirement</i>) <ul style="list-style-type: none"> <li>– Survivor benefit to eligible spouse or children no less than 50% of current pay.</li> </ul> </li> </ul>
In-service COLA	<ul style="list-style-type: none"> <li>• COLA provisions determined by amount of service relative to 12 years and date of employment.</li> </ul>
BackDROP	<ul style="list-style-type: none"> <li>• Not available</li> </ul>
Service purchases	<ul style="list-style-type: none"> <li>• 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.</li> </ul>
Service transfers	<ul style="list-style-type: none"> <li>• May transfer state service to other positions covered by MOSERS under 104.800.</li> </ul>
Member contributions	<ul style="list-style-type: none"> <li>• None</li> </ul>

## MSEP 2000

- First elected on or after July 1, 2000, but prior to January 1, 2011
- 4 years (1 term)
- (Active elected official's pay ÷ 24) x 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

- 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

- First elected on or after January 1, 2011
- 4 years (1 term)
- (Active elected official's pay ÷ 24) x 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

- Not available

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

- Not available

- 4% of pay

## Comparison of Plans for Judges | June 30, 2016

## Judicial Plan • Judicial Plan 2011

Benefit Provisions	Judicial Plan
Membership eligibility	<ul style="list-style-type: none"> <li>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.</li> </ul>
Vesting	<ul style="list-style-type: none"> <li>Immediate</li> </ul>
Base benefit formula	<ul style="list-style-type: none"> <li>Monthly pay x .50 = monthly base benefit</li> </ul>
Temporary benefit formula	<ul style="list-style-type: none"> <li>Not available</li> </ul>
Benefit payment options	<ul style="list-style-type: none"> <li>Life income annuity</li> <li>Automatic <i>unreduced</i> joint and 50% survivor option <i>If married at least two continuous years immediately preceding judges death.</i></li> </ul>
Cost-of-living adjustment (COLA)	<ul style="list-style-type: none"> <li>If hired before August 28, 1997, will receive 4-5% each year until reaching 65% cap. After COLA cap, the rate is based on 80% of the percentage increase in the CPI (0-5%)</li> <li>If hired on or after August 28, 1997, based on 80% of the percentage increase in the CPI (0-5%).</li> </ul>
Normal retirement eligibility	<ul style="list-style-type: none"> <li>Age 62 with 12 years service</li> <li>Age 60 with 15 years service</li> <li>Age 55 with 20 years service</li> </ul>
Reduced retirement eligibility	<ul style="list-style-type: none"> <li>Age 60 if less than 15 years service</li> <li>Age 62 if less than 12 years service</li> </ul>
Death before retirement	<ul style="list-style-type: none"> <li>Non duty-related death <ul style="list-style-type: none"> <li>Survivor benefit to eligible spouse equal to 50% of the benefit the member would have received based on service to age 70.</li> </ul> </li> </ul>
In-service COLA	<ul style="list-style-type: none"> <li>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.</li> </ul>
BackDROP	<ul style="list-style-type: none"> <li>Not available</li> </ul>
Service purchases	<ul style="list-style-type: none"> <li>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.</li> </ul>
Service transfers	<ul style="list-style-type: none"> <li>May transfer state service to other positions covered by MOSERS under 104.800.</li> </ul>
Member contributions	<ul style="list-style-type: none"> <li>None</li> </ul>

### 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 for the first time on or after January 1, 2011.

- Immediate
- Monthly pay x .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 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



## Comparison of Plans for Uniformed Members of the Water Patrol | June 30, 2016

## MSEP • MSEP 2000

Benefit Provisions	MSEP	MSEP 2000
Membership eligibility	<ul style="list-style-type: none"> <li>Members who work in a permanent position normally requiring at least 1,040 hours of work a year.</li> </ul>	<ul style="list-style-type: none"> <li>Members hired 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.</li> <li>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.</li> </ul>
Vesting	<ul style="list-style-type: none"> <li>5 years of service</li> </ul>	<ul style="list-style-type: none"> <li>5 years of service</li> </ul>
Base benefit formula	<ul style="list-style-type: none"> <li>1.6% x FAP x service increased by 33.3%</li> </ul>	<ul style="list-style-type: none"> <li>1.7% x FAP x service</li> </ul>
Temporary benefit formula	<ul style="list-style-type: none"> <li>Not available</li> </ul>	<ul style="list-style-type: none"> <li>0.8% x FAP x service (must retire under "Rule of 80")</li> </ul>
Benefit payment options	<ul style="list-style-type: none"> <li>Life income annuity</li> <li>Unreduced joint and 50% survivor</li> <li>Joint &amp; 100% survivor</li> <li>60 or 120 guaranteed payments</li> </ul>	<ul style="list-style-type: none"> <li>Life income annuity</li> <li>Joint &amp; 50% survivor</li> <li>Joint &amp; 100% survivor</li> <li>120 or 180 guaranteed payments</li> </ul>
Cost-of-living adjustment (COLA)	<ul style="list-style-type: none"> <li>If hired before August 28, 1997, will receive 4-5% each year until reaching 65% cap. After COLA cap, the rate is based on 80% of the percentage increase in the CPI (0-5%).</li> <li>If hired on or after August 28, 1997, based on 80% of the percentage increase in the CPI (0-5%).</li> </ul>	<ul style="list-style-type: none"> <li>Based on 80% of the percentage increase in the CPI (0-5%).</li> </ul>
Normal retirement eligibility	<ul style="list-style-type: none"> <li>Age 55 with 5 years of service</li> <li>"Rule of 80" - minimum age 48</li> </ul>	<ul style="list-style-type: none"> <li>Age 62 with 5 years of service</li> <li>"Rule of 80" - minimum age 48</li> </ul>
Early retirement eligibility	<ul style="list-style-type: none"> <li>Not available</li> </ul>	<ul style="list-style-type: none"> <li>Age 57 with 10 years of service</li> </ul>
Death before retirement	<ul style="list-style-type: none"> <li>Non duty-related death (<i>vested members</i>) <ul style="list-style-type: none"> <li>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.</li> </ul> </li> <li>Duty-related death (<i>no minimum service requirement</i>) <ul style="list-style-type: none"> <li>Survivor benefit to eligible spouse or children no less than 50% of current pay.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Non duty-related death (<i>vested members</i>) <ul style="list-style-type: none"> <li>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.</li> </ul> </li> <li>Duty-related death (<i>no minimum service requirement</i>) <ul style="list-style-type: none"> <li>Survivor benefit to eligible spouse or children no less than 50% of current pay.</li> </ul> </li> </ul>
In-service COLA	<ul style="list-style-type: none"> <li>COLA given for service beyond age 65. COLA provisions are determined by employment date.</li> </ul>	<ul style="list-style-type: none"> <li>Not available</li> </ul>
BackDROP	<ul style="list-style-type: none"> <li>Must work at least two years beyond normal retirement eligibility to be eligible for BackDROP.</li> </ul>	<ul style="list-style-type: none"> <li>Must work at least two years beyond normal retirement eligibility to be eligible for BackDROP.</li> </ul>
Service purchases	<ul style="list-style-type: none"> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>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.</li> </ul>
Service transfers	<ul style="list-style-type: none"> <li>May transfer state service to other positions covered by MOSERS under 104.800.</li> </ul>	<ul style="list-style-type: none"> <li>May transfer state service to other positions covered by MOSERS under 104.1090.</li> </ul>
Member contributions	<ul style="list-style-type: none"> <li>None</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>

## SUMMARY OF PLAN PROVISIONS

## Life Insurance Plans | June 30, 2016

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

## Active Members\*

Plan Provision	Requirement
<ul style="list-style-type: none"> <li>• <b>Basic life insurance</b> - An amount equal to one times annual salary (with a minimum of \$15,000) while actively employed.</li> </ul>	<ul style="list-style-type: none"> <li>• Actively employed in an eligible state position resulting in membership in MOSERS.</li> </ul>
<ul style="list-style-type: none"> <li>• <b>Duty-related death benefit</b> - 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.</li> </ul>	<ul style="list-style-type: none"> <li>• Actively employed in an eligible state position resulting in membership in MOSERS.</li> </ul>
<ul style="list-style-type: none"> <li>• <b>Optional life insurance</b> - 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.</li> </ul>	<ul style="list-style-type: none"> <li>• Actively employed in an eligible state position resulting in membership in MOSERS.</li> </ul>

\* Terminating employees may convert coverage up to the amount they had as an active employee at individual rates.

## Retired Members

Plan Provision	Requirement
<ul style="list-style-type: none"> <li>• <b>Basic life insurance at retirement</b> - \$5,000 basic life insurance during retirement.</li> </ul>	<ul style="list-style-type: none"> <li>• Must retire directly from active employment.</li> </ul>
<ul style="list-style-type: none"> <li>• <b>Optional life insurance at retirement (MSEP)</b> - 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.</li> </ul>	<ul style="list-style-type: none"> <li>• Must retire directly from active employment.</li> </ul>
<ul style="list-style-type: none"> <li>• <b>Optional life insurance at retirement (MSEP 2000)</b> - 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.</li> </ul>	<ul style="list-style-type: none"> <li>• Must retire directly from active employment.</li> </ul>
<ul style="list-style-type: none"> <li>• <b>Optional life insurance at retirement (MSEP 2011)</b> - 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.</li> </ul>	<ul style="list-style-type: none"> <li>• Must retire directly from active employment.</li> </ul>

*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, 2016

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

### Active Members

Classification	Requirement
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.	<ul style="list-style-type: none"> <li>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.</li> </ul>
Water patrol	<ul style="list-style-type: none"> <li>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.</li> </ul>
Judges	<ul style="list-style-type: none"> <li>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.</li> </ul>

### Changes in Plan Provisions

During the 2016 legislative session, Senate Bill 585 was passed and signed by the Governor. This bill provides for MOSERS coverage of juvenile court positions in multi-county judicial circuits when such circuits split into single county circuits and all salary for these positions is received from the state; otherwise, there were no changes in benefit plan provisions this year.

## Actuarial Present Values | June 30, 2016

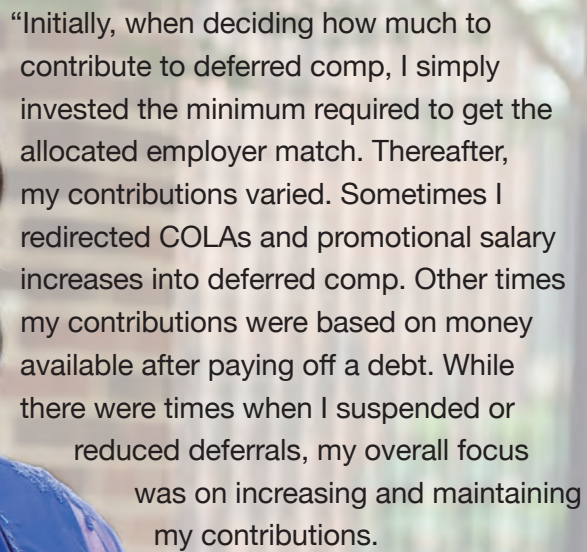
### MSEP

Actuarial Present Value June 30, 2016	Actuarial Present Value	Portion Covered by Future Normal Cost Contributions	Actuarial Accrued Liabilities
<b>Active members</b>			
Service retirement benefits based on services rendered before and likely to be rendered after valuation date	\$5,058,251,210	\$ 650,835,032	\$ 4,407,416,178
Disability benefits likely to be paid to present active members who become totally and permanently disabled	167,686,558	103,681,884	64,004,674
Survivor benefits likely to be paid to widows and children of present active members who die before retiring	58,052,028	14,107,063	43,944,965
Separation benefits likely to be paid to present active members	396,014,751	181,973,237	214,041,514
Refunds likely to be paid to present active members	54,369,551	52,593,418	1,776,133
<b>Active member totals</b>	<b>\$5,734,374,098</b>	<b>\$1,003,190,634</b>	<b>4,731,183,464</b>
<b>Members on leave of absence &amp; LTD</b>			
Service retirement benefits based on service rendered before the valuation date			121,521,161
<b>Terminated-vested members</b>			
Service retirement benefits based on service rendered before the valuation date			592,562,844
<b>Retired lives</b>			7,293,973,373
<b>Pending refunds</b>			11,405,729
<b>BackDROP installment payments incurred, but not yet paid</b>			516,182
<b>Total actuarial accrued liability</b>			12,751,162,753
Less: actuarial value of assets			8,878,057,191
<b>Unfunded actuarial accrued liability</b>			<b>\$ 3,873,105,562</b>
<b>Funded ratio</b>			69.6%

**Actuarial Present Values | June 30, 2016****Judicial Plan**

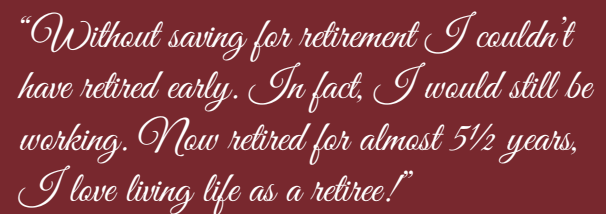
Actuarial Present Value June 30, 2016	Actuarial Present Value	Portion Covered by Future Normal Cost Contributions	Actuarial Accrued Liabilities
<b>Active members</b>			
Service retirement benefits based on services rendered before and likely to be rendered after valuation date	\$246,664,413	\$64,303,520	\$182,360,893
Disability benefits likely to be paid to present active members who become totally and permanently disabled	1,446,086	1,488,681	(42,595)
Survivor benefits likely to be paid to widows and children of present active members who die before retiring	4,555,333	2,671,030	1,884,303
Separation benefits likely to be paid to present active members	8,584,028	8,387,082	196,946
Refunds likely to be paid to present active members	48,682	43,749	4,933
<b>Active member totals</b>	<b>\$261,298,542</b>	<b>\$76,894,062</b>	<b>184,404,480</b>
<b>Retired lives</b>			354,715,048
<b>Terminated-vested members</b>			7,897,327
<b>Member on leave of absence</b>			0
<b>Members on LTD</b>			604,762
<b>Total actuarial accrued liability</b>			<b>547,621,617</b>
Less: actuarial value of assets			143,468,860
<b>Unfunded actuarial accrued liability</b>			<b>\$404,152,757</b>
<b>Funded ratio</b>			<b>26.2%</b>





Without saving for retirement I couldn't have retired early. In fact, I would still be working. Now retired for almost 5½ years, I love living life as a retiree! The freedom of a well-planned retirement life is hard to describe, it's sort of like fine chocolate — once you've had a taste of it, you want more and won't want to give it up!"

– *Jacque*  
MOSERS' Retiree





## **Statistical Section**

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## Summary

### Plan Membership

Membership in the pension trusts administered by MOSERS increased by 1,571. Active members decreased by 513, retired members and their beneficiaries increased by 1,865, and terminated-vested members increased by 219. Membership data for the last ten years ended June 30, 2016, can be found on page 134. The location of benefit recipients, showing that the majority remain in the state of Missouri after retirement, is depicted on page 135.

### Valuation Assets vs Pension Liabilities

The charts on 130-132 graphically represent the funding progress of the pension plans for the 10 years ended June 30, 2016. 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, 2016.

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 130-134, 138, and 148-149). 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

	2007	2008	2009	2010
<b>MSEP</b>				
<i>Additions</i>				
Employer contributions	\$ 239,488,751	\$ 249,770,156	\$ 252,105,008	\$ 251,226,187
Employee contributions	0	0	0	0
Member service purchases	3,460,923	3,085,133	3,235,999	3,576,954
Service transfers in	172,936	38,069	28,075	10,009
Investment income (net of expenses)	1,283,573,438	110,627,355	(1,508,376,715)	859,898,512
Other	542,266	572,274	619,060	639,901
Total additions to plan net position	1,527,238,314	364,092,987	(1,252,388,573)	1,115,351,563
<i>Deductions</i>				
Benefits	447,240,771	479,853,891	511,466,555	543,284,289
Refunds	0	0	0	3,106
Service transfers out	51,980	251,443	0	462,970
Administrative expenses	6,689,710	6,950,878	7,088,483	7,064,544
Total deductions from plan net position	453,982,461	487,056,212	518,555,038	550,814,909
<b>Change in net position</b>	<b>\$1,073,255,853</b>	<b>\$(122,963,225)</b>	<b>\$(1,770,943,611)</b>	<b>\$ 564,536,654</b>
<b>Judicial Plan</b>				
<i>Additions</i>				
Employer contributions	\$23,745,467	\$26,215,309	\$27,725,882	\$27,029,198
Employee contributions	0	0	0	0
Investment income (net of expenses)	11,356,312	1,043,940	(15,847,382)	9,909,718
Other	4,798	5,506	6,504	7,374
Total additions to plan net position	35,106,577	27,264,755	11,885,004	36,946,290
<i>Deductions</i>				
Benefits	20,595,504	22,058,085	23,232,088	24,230,545
Refunds				
Administrative expenses	59,187	66,880	74,473	81,414
Total deductions from plan net position	20,654,691	22,124,965	23,306,561	24,311,959
<b>Change in net position</b>	<b>\$ 14,451,886</b>	<b>\$ 5,139,790</b>	<b>\$ (11,421,557)</b>	<b>\$ 12,634,331</b>
<b>Internal Service Fund</b>				
<i>Operating revenues</i>				
Premium receipts	\$ 27,101,931	\$ 27,957,666	\$28,990,057	\$ 29,098,799
Deferred compensation receipts	0	60,393,973	75,661,047	69,143,267
Miscellaneous income	436,502	536,493	1,027,380	1,039,369
Total operating revenues	27,538,433	88,888,132	105,678,484	99,281,435
<i>Operating expenses</i>				
Premium disbursements	27,063,815	27,927,265	28,968,981	29,077,825
Deferred compensation disbursements	0	60,371,802	75,683,218	69,143,267
Premium refunds	38,116	30,401	21,076	20,974
Administrative expenses	527,040	708,100	819,581	797,020
Total operating expenses	27,628,971	89,037,568	105,492,856	99,039,086
<i>Non-operating revenues</i>				
Investment income	117,729	77,396	20,755	9,816
<b>Change in net position</b>	<b>\$ 27,191</b>	<b>\$ (72,040)</b>	<b>\$ 206,383</b>	<b>\$ 252,165</b>

2011	2012	2013	2014	2015	2016
\$ 263,418,048	\$ 263,373,924	\$ 274,655,284	\$ 326,370,336	\$ 329,752,832	\$ 329,957,369
599,761	4,955,399	9,698,883	14,025,328	18,099,455	21,684,920
2,814,551	2,869,085	3,475,123	2,909,423	1,859,005	2,815,749
142,248	2,675,339	2,446,627	2,252,206	3,575,815	2,107,873
1,395,677,299	158,102,123	778,008,348	1,484,709,539	(237,603,530)	1,194,422
659,474	448,463	489,193	450,453	533,001	545,847
1,663,311,381	432,424,333	1,068,773,458	1,830,717,285	116,216,578	358,306,180
597,424,954	611,522,451	646,708,308	677,097,411	723,994,041	750,440,412
0	123,709	622,341	1,421,856	2,479,264	3,798,199
17,745,828	588,180	1,911,665	1,916,840	1,792,495	3,071,892
7,054,581	7,017,057	7,575,883	7,336,922	8,077,692	8,489,375
622,225,363	619,251,397	656,818,197	687,773,029	736,343,492	765,799,878
\$1,041,086,018	\$(186,827,064)	\$ 411,955,261	\$1,142,944,256	\$(620,126,914)	\$(407,493,698)
\$ 27,702,682	\$ 26,324,526	\$ 28,330,649	\$ 29,264,877	\$ 32,696,686	\$ 33,642,498
59,958	149,859	211,936	294,810	488,193	661,206
17,460,050	2,061,916	10,724,252	21,388,261	(3,618,469)	19,273
8,250	5,849	6,743	6,489	8,117	8,808
45,230,940	28,542,150	39,273,580	50,954,437	29,574,527	34,331,785
25,488,531	26,821,412	27,802,871	29,406,625	31,245,906	32,979,706
88,253	91,514	104,428	105,693	123,015	136,983
25,576,784	26,912,926	27,907,299	29,512,318	31,368,921	33,126,697
\$ 19,654,156	\$ 1,629,224	\$ 11,366,281	\$ 21,442,119	\$ (1,794,394)	\$ 1,205,088
\$ 28,829,638	\$ 28,578,326	\$ 28,961,637	\$ 29,563,054	\$ 30,177,918	\$ 30,360,162
54,221,226	17,500,476	0	1,000,000	0	0
981,404	608,187	480,120	480,120	480,120	480,120
84,032,268	46,686,989	29,441,757	31,043,174	30,658,038	30,840,282
28,804,638	28,556,036	28,930,950	29,544,110	30,157,271	30,328,802
54,221,226	17,500,476	0	0	0	0
24,999	22,291	30,687	18,942	20,646	31,360
826,809	778,529	805,457	755,945	960,827	1,015,578
83,877,672	46,857,332	29,767,094	30,318,997	31,138,744	31,375,740
11,071	11,068	12,075	11,886	12,549	18,777
\$ 165,667	\$ (159,275)	\$ (313,262)	\$ 736,063	\$ (468,157)	\$ (516,681)

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

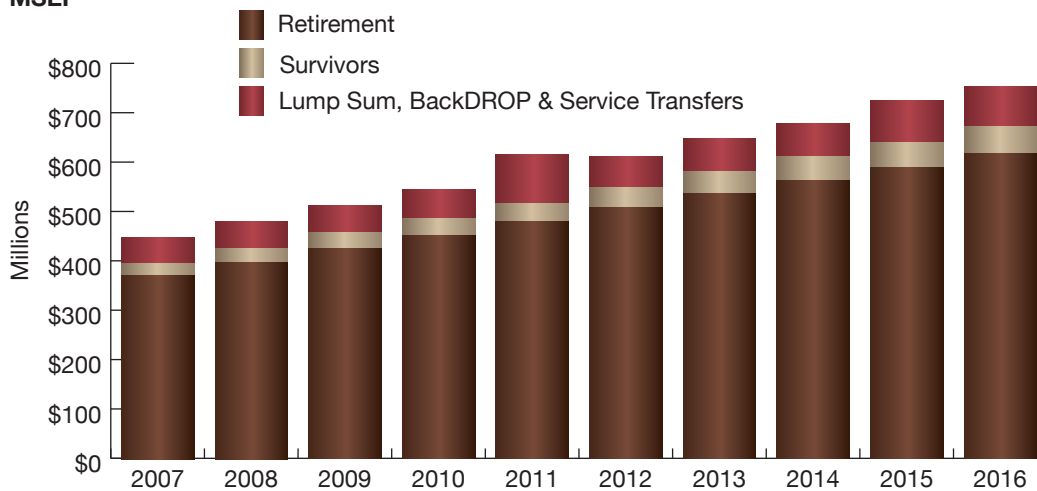
### MSEP

Type of benefit	FY07	FY08	FY09	FY10
Retirement	\$366,185,990	\$393,328,057	\$421,847,017	\$448,880,110
Survivors	29,340,464	31,894,702	34,615,979	37,718,898
Disability	42,273	36,825	33,812	33,403
Lump sum	556,568	454,643	272,189	409,787
BackDROP and service transfers	51,115,476	54,139,664	54,697,557	56,705,060
Total benefits	\$447,240,771	\$479,853,891	\$511,466,554	\$543,747,258
Refunds	\$ 0	\$ 0	\$ 0	\$ 3,106

### Judicial Plan

Type of benefit	FY07	FY08	FY09	FY10
Retirement	\$17,135,426	\$18,342,676	\$19,143,753	\$19,784,720
Survivors	3,433,078	3,715,409	4,088,335	4,445,825
Disability	27,000	0	0	0
Total benefits	\$20,595,504	\$22,058,085	\$23,232,088	\$24,230,545
Refunds	\$ 0	\$ 0	\$ 0	\$ 0

### MSEP

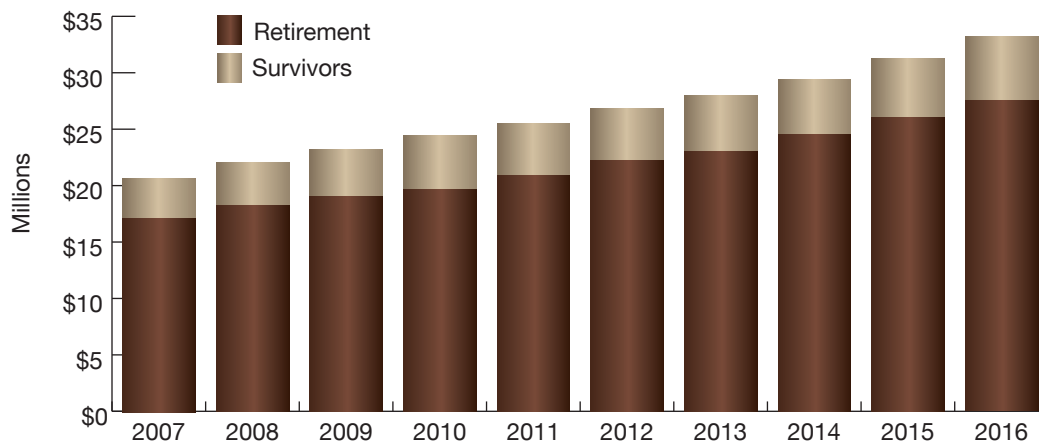


Disability benefits are included, but amounts are too minimal to display visually in graph.

FY11	FY12	FY13	FY14	FY15	FY16
\$476,841,741	\$504,555,055	\$533,962,630	\$560,553,490	\$586,597,187	\$615,708,229
39,968,601	42,963,959	46,659,381	49,922,170	52,940,062	56,495,787
29,191	29,503	27,255	22,468	16,857	15,470
293,147	229,650	191,320	286,184	57,525	267,198
98,038,103	64,332,464	67,779,388	68,229,937	86,174,905	81,025,620
\$615,170,783	\$612,110,631	\$648,619,974	\$679,014,249	\$725,786,536	\$753,512,304
\$ 0	\$ 123,709	\$ 622,341	\$ 1,421,856	\$ 2,479,264	\$ 3,798,199

FY11	FY12	FY13	FY14	FY15	FY16
\$21,025,904	\$22,284,844	\$23,123,707	\$24,609,421	\$26,181,505	\$27,641,108
4,462,627	4,536,569	4,679,169	4,797,204	5,064,400	5,338,598
0	0	0	0	0	0
\$25,488,531	\$26,821,413	\$27,802,876	\$29,406,625	\$31,245,905	\$32,979,706
\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 10,008

### Judicial Plan

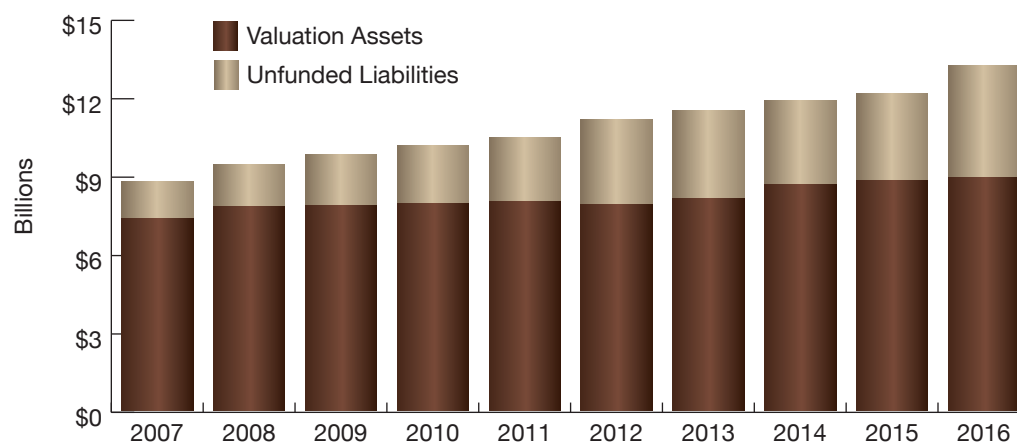
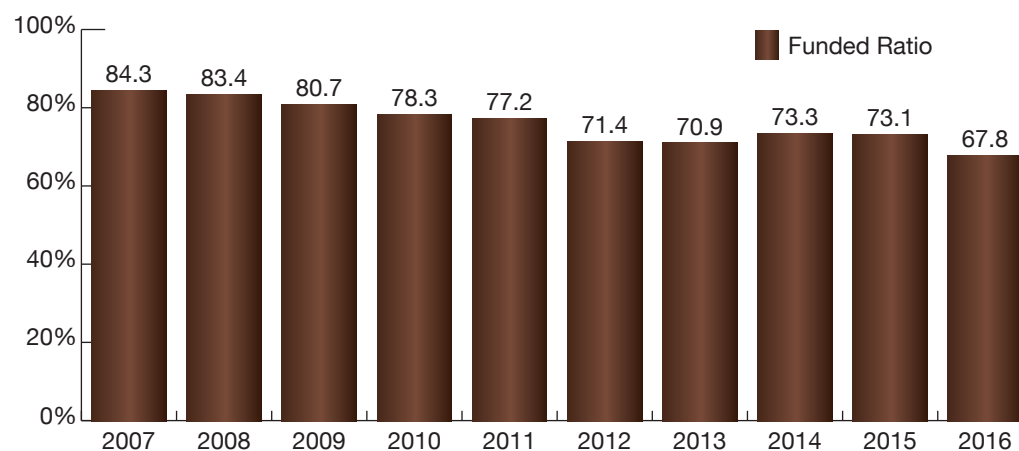


Disability benefits are included, but amounts are too minimal to display visually in graph.



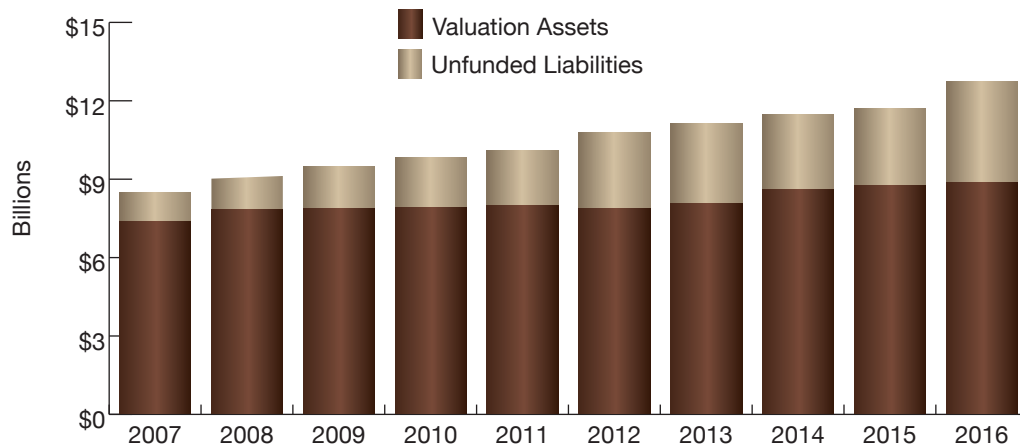
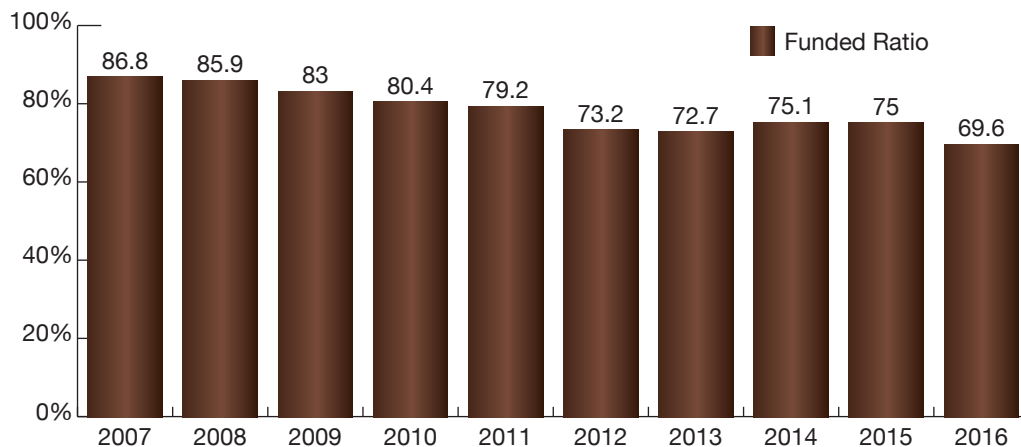
*Pension Trust Funds***Valuation Assets (Smoothed Market) vs. Pension Liabilities** | Ten Years Ended June 30, 2016**All Plans Combined**

Fiscal Year	Dollars in Billions			
	Valuation Assets	Unfunded Liabilities	Accrued Liabilities	Funded Ratios
2007	\$7.4392	\$1.3879	\$ 8.8271	84.3%
2008	7.9117	1.5714	9.4831	83.4
2009	7.9574	1.9065	9.8639	80.7
2010	8.0123	2.2228	10.2352	78.3
2011	8.1210	2.3960	10.5170	77.2
2012	7.9994	3.2076	11.2070	71.4
2013	8.2075	3.3624	11.5700	70.9
2014	8.7621	3.1949	11.9569	73.3
2015	8.9268	3.2838	12.2106	73.1
2016	9.0216	4.2772	13.2988	67.8

**Actuarial Accrued Liabilities** | All Plans Combined**Valuation Assets as Percents of Pension Liabilities** | All Plans Combined

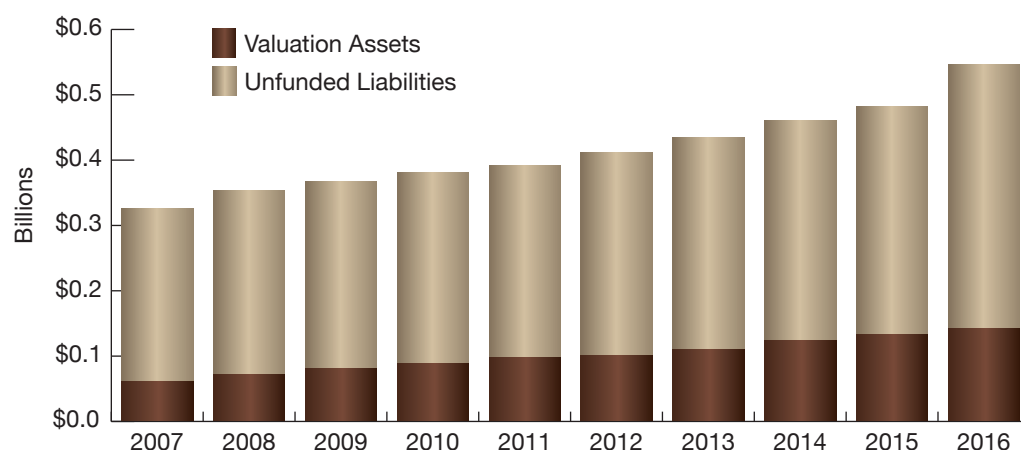
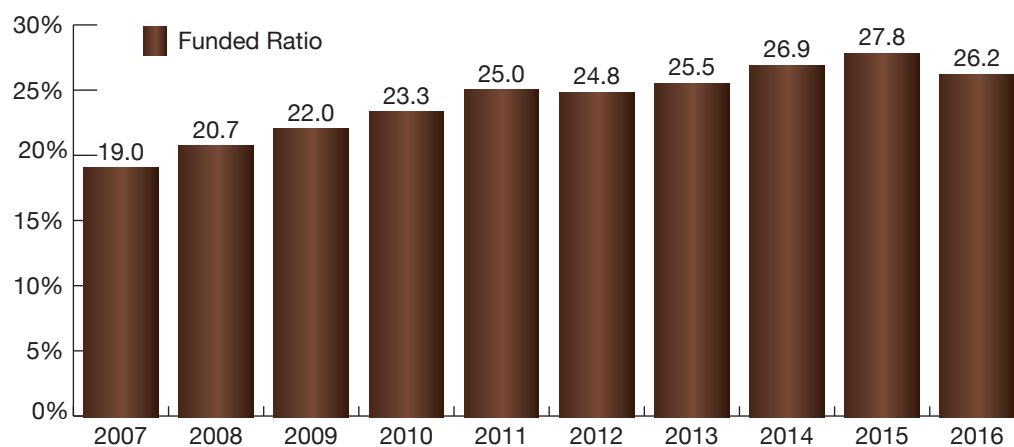
*Pension Trust Funds***Valuation Assets (Smoothed Market) vs. Pension Liabilities | Ten Years Ended June 30, 2016****MSEP**

Fiscal Year	Dollars in Billions			
	Valuation Assets	Unfunded Liabilities	Accrued Liabilities	Funded Ratios
2007	\$7.3773	\$1.1231	\$ 8.5004	86.8%
2008	7.8385	1.2898	9.1283	85.9
2009	7.8761	1.6187	9.4948	83.0
2010	7.9234	1.9300	9.8532	80.4
2011	8.0225	2.1010	10.1240	79.2
2012	7.8972	2.8965	10.7937	73.2
2013	8.0964	3.0382	11.1346	72.7
2014	8.6378	2.8568	11.4946	75.1
2015	8.7925	2.9351	11.7276	75.0
2016	8.8781	3.8731	12.7512	69.6

**Actuarial Accrued Liabilities | MSEP****Valuation Assets as Percents of Pension Liabilities | MSEP**

*Pension Trust Funds***Valuation Assets (Smoothed Market) vs. Pension Liabilities** | Ten Years Ended June 30, 2016**Judicial Plan**

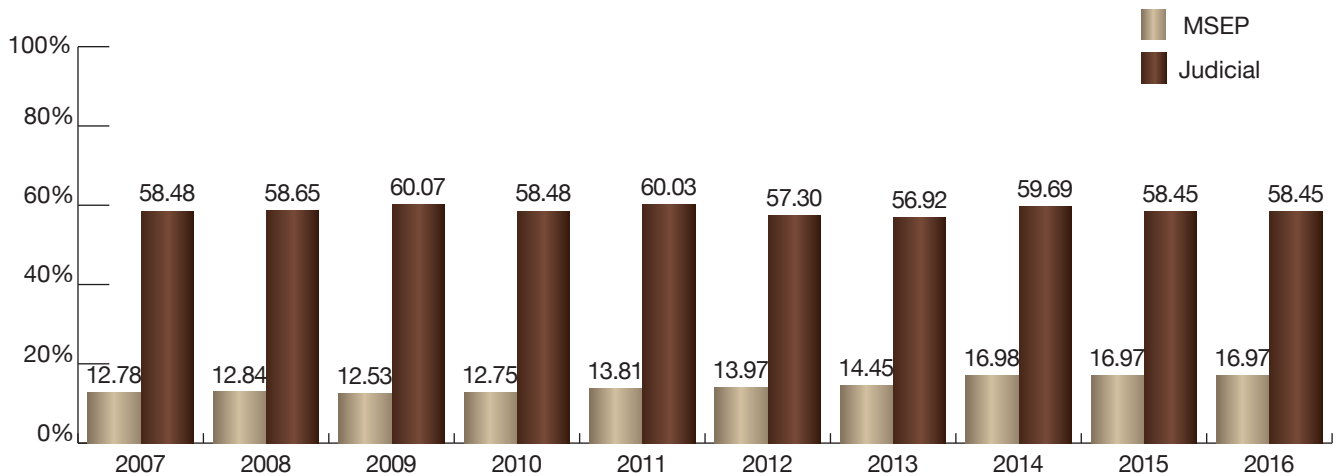
Dollars in Billions				
Fiscal Year	Valuation Assets	Unfunded Liabilities	Accrued Liabilities	Funded Ratios
2007	\$0.0619	\$0.2648	\$0.3267	19.0%
2008	0.0732	0.2816	0.3548	20.7
2009	0.0813	0.2878	0.3691	22.0
2010	0.0890	0.2930	0.3820	23.3
2011	0.0984	0.2951	0.3935	25.0
2012	0.1023	0.3111	0.4133	24.8
2013	0.1111	0.3242	0.4354	25.5
2014	0.1243	0.3381	0.4623	26.9
2015	0.1343	0.3486	0.4830	27.8
2016	0.1435	0.4041	0.5476	26.2

**Actuarial Accrued Liabilities** | Judicial Plan**Valuation Assets as Percents of Pension Liabilities** | Judicial Plan

## Contribution Rates as a Percent of Payroll | Last Ten Fiscal Years

Fiscal Year	MSEP	Judicial Plan
2007	12.78%	58.48%
2008	12.84	58.65
2009	12.53	60.07
2010	12.75	58.48
2011	13.81	60.03
2012	13.97	57.30
2013	14.45	56.92
2014	16.98	59.69
2015	16.97	58.45
2016	16.97	58.45

### Contribution Rates



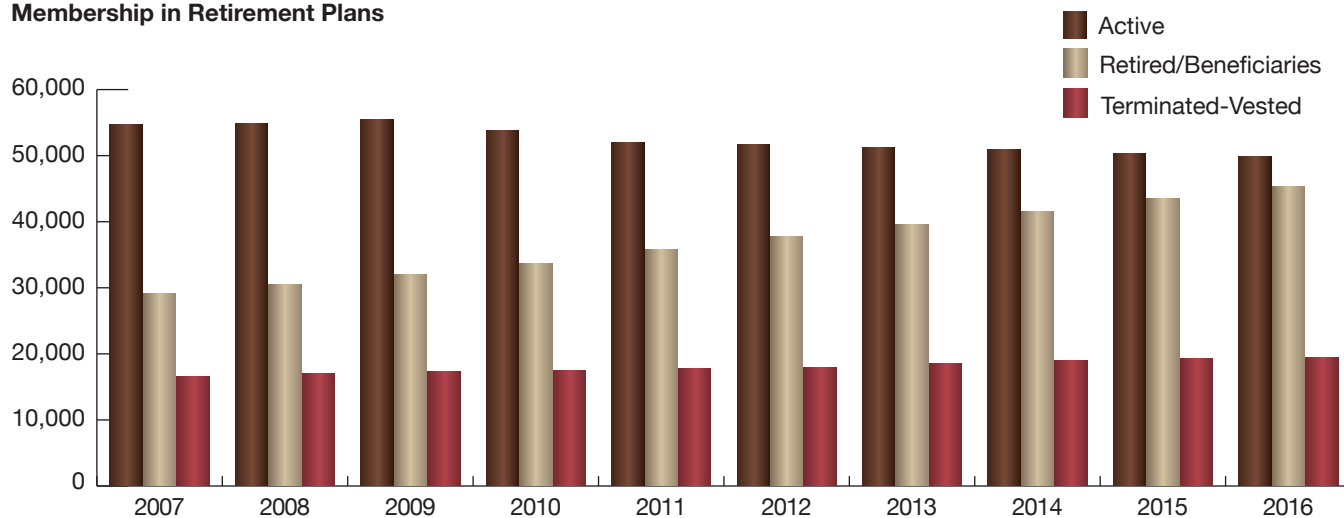
## Membership in Retirement Plans | Last Ten Fiscal Years

### All Plans Combined

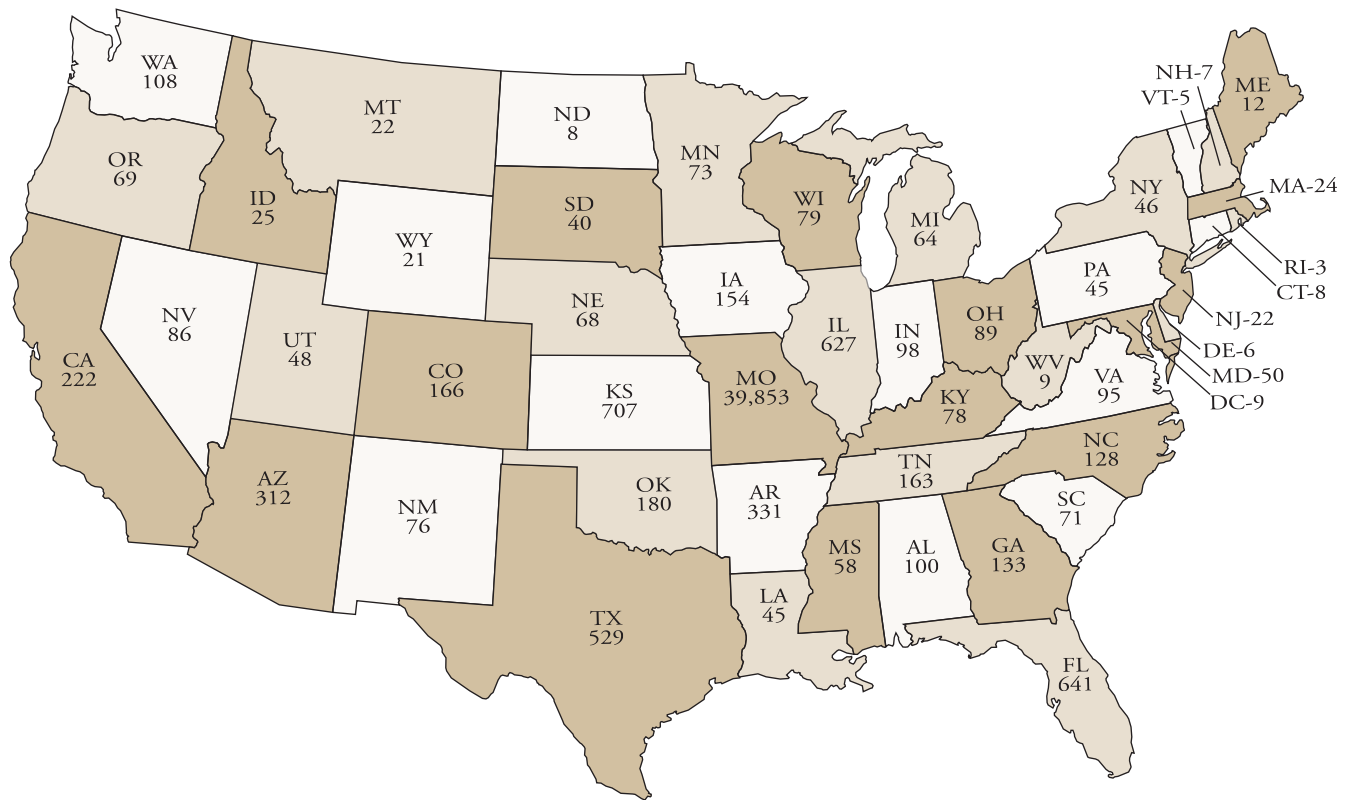
Fiscal Year	Active*	Retired/Beneficiaries	Terminated-Vested	Totals
2007	54,763	29,129	16,578	100,470
2008	54,943	30,572	17,123	102,638
2009	55,454	32,100	17,304	104,858
2010	53,880	33,716	17,441	105,037
2011	52,059	35,801	17,757	105,617
2012	51,730	37,796	18,075	107,601
2013	51,233	39,636	18,581	109,450
2014	51,026	41,511	18,957	111,494
2015	50,385	43,503	19,319	113,207
2016	49,872	45,368	19,538	114,778

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

### Membership in Retirement Plans



## Distribution of Benefit Recipients by Location | June 30, 2016



### Benefit Recipients Outside the Continental United States

17 Alaska	1 Ecuador	1 Philippines
8 Hawaii	1 Germany	1 Sri Lanka
2 Army Post Office	1 Guam	1 Sweden
1 Argentina	1 India	1 Thailand
3 Australia	2 Ireland	1 The Netherlands
14 Canada	2 Israel	1 United Arab Emirates
1 Colombia	2 Italy	3 United Kingdom
1 Costa Rica	1 Mexico	3 Virgin Islands
1 Croatia	1 Marshall Islands	
1 Czech Republic	1 P. R. China	



**Benefit Recipients by Type of Retirement and Option Selected | June 30, 2016****MSEP**

Amount of Monthly Benefit	Number of Benefit Recipients	Type of Retirement						
		A	B	C	D	E	F	G
1-250	5,427	2,001	2,525	269	545	1	0	86
251-500	7,759	3,779	2,737	411	739	3	0	90
501-750	5,435	3,181	1,328	313	570	0	0	43
751-1000	4,897	3,653	598	207	409	0	0	30
1001-1250	4,259	3,600	254	128	261	0	0	16
1251-1500	3,549	3,123	125	90	203	0	0	8
1501-1750	2,948	2,662	66	65	152	0	0	3
1751-2000	2,416	2,221	47	41	104	0	0	3
Over 2000	8,648	8,051	63	144	387	0	0	3
Total	45,338	32,271	7,743	1,668	3,370	4	0	282

**Judicial Plan**

Amount of Monthly Benefit	Number of Benefit Recipients	Type of Retirement						
		A	B	C	D	E	F	G
1-250	3	0	1	0	2	0	0	0
251-500	8	0	6	0	1	0	0	1
501-750	7	0	3	0	3	0	0	1
751-1000	7	1	2	1	2	0	0	1
1001-1250	2	0	1	0	1	0	0	0
1251-1500	9	1	5	1	0	0	0	2
1501-1750	5	0	4	0	1	0	0	0
1751-2000	6	0	1	3	1	0	0	1
Over 2000	502	313	53	29	104	0	0	3
Total	549	315	76	34	115	0	0	9

**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									
1	2	3	4	5	6	7	8	9	10
0	17	243	209	312	0	1,148	458	41	2,999
8	42	260	205	461	3	1,630	876	27	4,247
9	32	133	84	292	1	1,152	1,073	3	2,656
7	25	83	56	336	1	1,138	1,030	5	2,216
9	19	58	40	423	0	941	749	3	2,017
7	11	52	33	430	1	812	561	1	1,641
6	7	50	27	403	0	618	384	0	1,453
9	5	26	18	385	1	498	293	0	1,181
69	18	88	40	1,194	0	2,382	1,142	0	3,715
124	176	993	712	4,236	7	10,319	6,566	80	22,125

Option Selected									
1	2	3	4	5	6	7	8	9	10
3	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	1
5	0	0	0	1	0	0	0	0	1
4	0	0	0	0	0	1	0	0	2
2	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	2
5	0	0	0	0	0	0	0	0	0
2	0	0	0	1	0	0	0	0	3
467	0	0	0	23	0	0	0	1	11
502	0	0	0	25	0	1	0	1	20

**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, 2016

**MSEP**

Type of Benefit	Number	Annual Benefits	Average Annual Benefits
<b>Service retirement</b>			
Life annuity	5,673	\$ 79,297,703	\$13,978
50% joint and survivor	5,278	95,672,250	18,127
100% joint and survivor	2,935	61,173,130	20,843
5-year certain and life	144	1,584,272	11,002
10-year certain and life	160	1,773,398	11,084
Survivor beneficiary	2,501	31,904,311	12,757
Total	16,691	271,405,064	16,261
<b>Disability retirement</b>	4	14,640	3,660
<b>Death-in-service</b>	1,458	16,765,144	11,499
Grand totals	18,153	\$288,184,848	\$15,875

**MSEP 2000**

Type of Benefit	Number	Annual Benefits	Average Annual Benefits
<b>Service retirement</b>			
Life annuity	15,975	\$224,376,119	\$14,045
50% joint and survivor	3,855	76,033,837	19,723
100% joint and survivor	4,424	70,439,754	15,922
5-year certain and life	26	378,402	14,554
10-year certain and life	736	7,436,891	10,104
15-year certain and life	593	4,974,231	8,388
Survivor beneficiary	866	8,175,375	9,440
Total	26,475	391,814,609	14,799
<b>Death-in-service</b>	199	799,746	4,019
Grand totals	26,674	\$392,614,355	\$14,719

**Judicial Plan**

Type of Benefit	Number	Annual Benefits	Average Annual Benefits
<b>Service retirement</b>			
Life annuity	4	\$ 309,852	\$77,463
50% joint and survivor	388	27,542,406	70,986
100% joint and survivor	1	10,560	10,560
Survivor beneficiary	113	4,194,177	37,117
Total	506	32,056,995	63,354
<b>Death-in-service</b>	34	1,132,836	33,319
Grand totals	540	\$33,189,831	\$61,463

## Average Monthly Benefit Amounts | Ten Years Ended June 30, 2016

## MSEP

Members Retiring During Fiscal Year		Years Credited Service by Category							All Members
		<5	5-10	11-15	16-20	21-25	26-30	31+	
2007	Average monthly benefit	\$ 150	\$ 277	\$ 482	\$ 685	\$ 1,132	\$ 1,572	\$ 1,849	\$ 961
	Average final average salary	\$ 2,613	\$ 2,360	\$ 2,533	\$ 2,616	\$ 2,993	\$ 3,324	\$ 3,428	\$ 2,854
	Number of retirees	1	388	285	296	311	420	197	1,898
2008	Average monthly benefit	\$ 0	\$ 265	\$ 474	\$ 732	\$ 1,114	\$ 1,598	\$ 2,035	\$ 949
	Average final average salary	\$ 0	\$ 2,366	\$ 2,456	\$ 2,804	\$ 2,971	\$ 3,388	\$ 3,673	\$ 2,877
	Number of retirees	0	366	361	300	323	361	183	1,894
2009	Average monthly benefit	\$ 0	\$ 291	\$ 491	\$ 750	\$ 1,262	\$ 1,650	\$ 2,166	\$ 988
	Average final average salary	\$ 0	\$ 2,418	\$ 2,462	\$ 2,873	\$ 3,288	\$ 3,488	\$ 3,931	\$ 2,984
	Number of retirees	0	424	352	292	382	367	163	1,980
2010	Average monthly benefit	\$ 569	\$ 286	\$ 509	\$ 780	\$ 1,194	\$ 1,607	\$ 2,120	\$ 953
	Average final average salary	\$ 6,867	\$ 2,529	\$ 2,599	\$ 2,885	\$ 3,188	\$ 3,495	\$ 3,826	\$ 2,998
	Number of retirees	3	450	412	324	347	324	210	2,070
2011	Average monthly benefit	\$ 39	\$ 335	\$ 505	\$ 822	\$ 1,226	\$ 1,659	\$ 2,116	\$ 1,017
	Average final average salary	\$ 925	\$ 2,629	\$ 2,528	\$ 3,051	\$ 3,235	\$ 3,534	\$ 3,847	\$ 3,069
	Number of retirees	3	556	464	414	463	476	270	2,646
2012	Average monthly benefit	\$ 139	\$ 306	\$ 524	\$ 830	\$ 1,234	\$ 1,643	\$ 2,267	\$ 950
	Average final average salary	\$ 8,932	\$ 2,572	\$ 2,668	\$ 3,073	\$ 3,289	\$ 3,528	\$ 4,098	\$ 3,070
	Number of retirees	4	555	504	388	443	358	189	2,441
2013	Average monthly benefit	\$ 251	\$ 326	\$ 524	\$ 753	\$ 1,246	\$ 1,699	\$ 2,005	\$ 932
	Average final average salary	\$ 3,744	\$ 2,667	\$ 2,592	\$ 2,814	\$ 3,319	\$ 3,637	\$ 3,664	\$ 3,014
	Number of retirees	5	578	532	371	428	378	199	2,491
2014	Average monthly benefit	\$ 280	\$ 311	\$ 518	\$ 806	\$ 1,197	\$ 1,693	\$ 2,211	\$ 943
	Average final average salary	\$ 4,426	\$ 2,689	\$ 2,611	\$ 3,016	\$ 3,225	\$ 3,653	\$ 4,007	\$ 3,072
	Number of retirees	5	616	490	361	428	387	198	2,485
2015	Average monthly benefit	\$ 219	\$ 314	\$ 523	\$ 799	\$ 1,271	\$ 1,723	\$ 2,217	\$ 998
	Average final average salary	\$ 5,058	\$ 2,597	\$ 2,627	\$ 2,952	\$ 3,424	\$ 3,726	\$ 4,016	\$ 3,120
	Number of retirees	6	641	514	433	443	481	250	2,768
2016	Average monthly benefit	\$ 151	\$ 307	\$ 506	\$ 819	\$ 1,300	\$ 1,838	\$ 2,360	\$ 1,016
	Average final average salary	\$ 3,284	\$ 2,623	\$ 2,600	\$ 3,020	\$ 3,445	\$ 3,968	\$ 4,204	\$ 3,175
	Number of retirees	6	611	502	430	505	423	215	2,692
Ten Years Ended June 30, 2016									
	Average monthly benefit	\$ 224	\$ 305	\$ 508	\$ 783	\$ 1,225	\$ 1,672	\$ 2,138	\$ 973
	Average final average salary	\$ 4,625	\$ 2,565	\$ 2,577	\$ 2,925	\$ 3,257	\$ 3,581	\$ 3,874	\$ 3,035
	Number of retirees	33	5,185	4,416	3,609	4,073	3,975	2,074	23,365

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, 2016

### General Employees in the MSEP\*

Members Retiring During Fiscal Year		Years Credited Service by Category							All Members
		<5	5-10	11-15	16-20	21-25	26-30	31+	
2007	Average monthly benefit	\$ 0	\$ 260	\$ 476	\$ 681	\$ 1,132	\$ 1,567	\$ 1,849	\$ 960
	Average final average salary	\$ 0	\$ 2,342	\$ 2,530	\$ 2,615	\$ 2,993	\$ 3,325	\$ 3,428	\$ 2,853
	Number of retirees	0	377	283	295	311	419	197	1,882
2008	Average monthly benefit	\$ 0	\$ 260	\$ 460	\$ 722	\$ 1,114	\$ 1,598	\$ 2,035	\$ 946
	Average final average salary	\$ 0	\$ 2,361	\$ 2,444	\$ 2,787	\$ 2,971	\$ 3,388	\$ 3,673	\$ 2,873
	Number of retirees	0	363	356	299	323	361	183	1,885
2009	Average monthly benefit	\$ 0	\$ 266	\$ 470	\$ 746	\$ 1,244	\$ 1,650	\$ 2,148	\$ 978
	Average final average salary	\$ 0	\$ 2,385	\$ 2,437	\$ 2,873	\$ 3,262	\$ 3,488	\$ 3,906	\$ 2,969
	Number of retirees	0	411	348	291	379	367	162	1,958
2010	Average monthly benefit	\$ 442	\$ 282	\$ 495	\$ 775	\$ 1,194	\$ 1,602	\$ 2,093	\$ 946
	Average final average salary	\$ 6,215	\$ 2,526	\$ 2,582	\$ 2,885	\$ 3,188	\$ 3,497	\$ 3,794	\$ 2,989
	Number of retirees	2	447	409	323	347	323	208	2,059
2011	Average monthly benefit	\$ 39	\$ 302	\$ 484	\$ 809	\$ 1,223	\$ 1,650	\$ 2,098	\$ 1,007
	Average final average salary	\$ 925	\$ 2,611	\$ 2,506	\$ 3,039	\$ 3,236	\$ 3,529	\$ 3,824	\$ 3,061
	Number of retirees	3	530	457	411	462	473	268	2,604
2012	Average monthly benefit	\$ 139	\$ 292	\$ 507	\$ 817	\$ 1,234	\$ 1,636	\$ 2,267	\$ 943
	Average final average salary	\$ 8,932	\$ 2,555	\$ 2,645	\$ 3,059	\$ 3,289	\$ 3,514	\$ 4,098	\$ 3,060
	Number of retirees	4	547	500	385	443	357	189	2,425
2013	Average monthly benefit	\$ 169	\$ 302	\$ 503	\$ 746	\$ 1,239	\$ 1,699	\$ 1,993	\$ 926
	Average final average salary	\$ 4,244	\$ 2,656	\$ 2,571	\$ 2,813	\$ 3,307	\$ 3,637	\$ 3,638	\$ 3,007
	Number of retirees	3	554	525	369	427	378	198	2,454
2014	Average monthly benefit	\$ 262	\$ 300	\$ 511	\$ 799	\$ 1,193	\$ 1,693	\$ 2,211	\$ 940
	Average final average salary	\$ 5,382	\$ 2,677	\$ 2,609	\$ 3,016	\$ 3,226	\$ 3,653	\$ 4,007	\$ 3,071
	Number of retirees	3	609	486	359	427	387	198	2,469
2015	Average monthly benefit	\$ 219	\$ 300	\$ 518	\$ 784	\$ 1,271	\$ 1,723	\$ 2,208	\$ 994
	Average final average salary	\$ 5,058	\$ 2,582	\$ 2,626	\$ 2,945	\$ 3,424	\$ 3,726	\$ 4,007	\$ 3,117
	Number of retirees	6	630	512	429	443	481	249	2,750
2016	Average monthly benefit	\$ 151	\$ 297	\$ 506	\$ 819	\$ 1,285	\$ 1,838	\$ 2,343	\$ 1,011
	Average final average salary	\$ 3,284	\$ 2,617	\$ 2,600	\$ 3,020	\$ 3,420	\$ 3,968	\$ 4,184	\$ 3,168
	Number of retirees	6	603	502	430	502	423	213	2,679
Ten Years Ended June 30, 2016									
	Average monthly benefit	\$ 188	\$ 289	\$ 496	\$ 775	\$ 1,219	\$ 1,669	\$ 2,127	\$ 967
	Average final average salary	\$ 4,810	\$ 2,551	\$ 2,564	\$ 2,919	\$ 3,250	\$ 3,580	\$ 3,860	\$ 3,029
	Number of retirees	27	5,071	4,378	3,591	4,064	3,969	2,065	23,165

\* 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, 2016

### Legislators in the MSEP

Members Retiring During Fiscal Year		Years Credited Service by Category							All Members
		<5	5-10	11-15	16-20	21-25	26-30	31+	
2007	Average monthly benefit	\$ 150	\$ 873	\$ 1,306	\$ 1,959	\$ 0	\$ 3,484	\$ 0	\$ 1,113
	Average final average salary	\$ 2,613	\$ 2,993	\$ 2,993	\$ 2,993	\$ 0	\$ 2,993	\$ 0	\$ 2,969
	Number of retirees	1	11	2	1	0	1	0	16
2008	Average monthly benefit	\$ 0	\$ 871	\$ 1,306	\$ 0	\$ 0	\$ 0	\$ 0	\$ 1,045
	Average final average salary	\$ 0	\$ 2,993	\$ 2,993	\$ 0	\$ 0	\$ 0	\$ 0	\$ 2,993
	Number of retirees	0	3	2	0	0	0	0	5
2009	Average monthly benefit	\$ 0	\$ 903	\$ 1,496	\$ 1,995	\$ 2,395	\$ 0	\$ 0	\$ 1,160
	Average final average salary	\$ 0	\$ 2,993	\$ 2,993	\$ 2,993	\$ 2,993	\$ 0	\$ 0	\$ 2,993
	Number of retirees	0	12	3	1	1	0	0	17
2010	Average monthly benefit	\$ 0	\$ 876	\$ 1,496	\$ 2,245	\$ 0	\$ 3,242	\$ 0	\$ 1,602
	Average final average salary	\$ 0	\$ 2,993	\$ 2,993	\$ 2,993	\$ 0	\$ 2,993	\$ 0	\$ 2,993
	Number of retirees	0	3	1	1	0	1	0	6
2011	Average monthly benefit	\$ 0	\$ 1,000	\$ 1,512	\$ 1,797	\$ 2,744	\$ 3,242	\$ 0	\$ 1,224
	Average final average salary	\$ 0	\$ 2,993	\$ 2,993	\$ 2,993	\$ 2,993	\$ 2,993	\$ 0	\$ 2,993
	Number of retirees	0	26	4	2	1	1	0	34
2012	Average monthly benefit	\$ 0	\$ 1,069	\$ 1,621	\$ 2,225	\$ 0	\$ 0	\$ 0	\$ 1,295
	Average final average salary	\$ 0	\$ 2,993	\$ 2,993	\$ 2,993	\$ 0	\$ 0	\$ 0	\$ 2,993
	Number of retirees	0	7	2	1	0	0	0	10
2013	Average monthly benefit	\$ 374	\$ 910	\$ 1,513	\$ 2,120	\$ 0	\$ 0	\$ 0	\$ 1,046
	Average final average salary	\$ 2,993	\$ 2,993	\$ 2,993	\$ 2,993	\$ 0	\$ 0	\$ 0	\$ 2,993
	Number of retirees	2	23	5	2	0	0	0	32
2014	Average monthly benefit	\$ 307	\$ 1,044	\$ 1,496	\$ 1,995	\$ 2,744	\$ 0	\$ 0	\$ 1,293
	Average final average salary	\$ 2,993	\$ 2,993	\$ 2,993	\$ 2,993	\$ 2,993	\$ 0	\$ 0	\$ 2,993
	Number of retirees	2	6	3	2	1	0	0	14
2015	Average monthly benefit	\$ 0	\$ 977	\$ 1,735	\$ 2,162	\$ 0	\$ 0	\$ 0	\$ 1,315
	Average final average salary	\$ 0	\$ 2,993	\$ 2,993	\$ 2,993	\$ 0	\$ 0	\$ 0	\$ 2,993
	Number of retirees	0	10	2	3	0	0	0	15
2016	Average monthly benefit	\$ 0	\$ 1,048	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 1,048
	Average final average salary	\$ 0	\$ 2,993	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 2,993
	Number of retirees	0	7	0	0	0	0	0	7
Ten Years Ended June 30, 2016									
	Average monthly benefit	\$ 302	\$ 958	\$ 1,501	\$ 2,056	\$ 2,628	\$ 3,323	\$ 0	\$ 1,190
	Average final average salary	\$ 2,917	\$ 2,993	\$ 2,993	\$ 2,993	\$ 2,993	\$ 2,993	\$ 0	\$ 2,991
	Number of retirees	5	108	24	13	3	3	0	156

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, 2016

## Elected Officials in the MSEP

Members Retiring During Fiscal Year		Years Credited Service by Category								All Members
		<5	5-10	11-15	16-20	21-25	26-30	31+		
2007	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
	Average final average salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
	Number of retirees	0	0	0	0	0	0	0	0	0
2008	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
	Average final average salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
	Number of retirees	0	0	0	0	0	0	0	0	0
2009	Average monthly benefit	\$ 0	\$ 3,336	\$ 4,852	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 4,094
	Average final average salary	\$ 0	\$ 8,979	\$ 9,703	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 9,341
	Number of retirees	0	1	1	0	0	0	0	0	2
2010	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
	Average final average salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
	Number of retirees	0	0	0	0	0	0	0	0	0
2011	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
	Average final average salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
	Number of retirees	0	0	0	0	0	0	0	0	0
2012	Average monthly benefit	\$ 0	\$ 0	\$ 3,781	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 3,781
	Average final average salary	\$ 0	\$ 0	\$ 8,093	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 8,093
	Number of retirees	0	0	2	0	0	0	0	0	2
2013	Average monthly benefit	\$ 0	\$ 0	\$ 4,489	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 4,489
	Average final average salary	\$ 0	\$ 0	\$ 8,979	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 8,979
	Number of retirees	0	0	1	0	0	0	0	0	1
2014	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
	Average final average salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
	Number of retirees	0	0	0	0	0	0	0	0	0
2015	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
	Average final average salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
	Number of retirees	0	0	0	0	0	0	0	0	0
2016	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
	Average final average salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
	Number of retirees	0	0	0	0	0	0	0	0	0
Ten Years Ended June 30, 2016										
	Average monthly benefit	\$ 0	\$ 3,336	\$ 4,226	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 4,048
	Average final average salary	\$ 0	\$ 8,979	\$ 8,717	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 8,769
	Number of retirees	0	1	4	0	0	0	0	0	5

Note: COLA increases are excluded from the above for comparison purposes.

## Average Monthly Benefit Amounts | Ten Years Ended June 30, 2016

### Uniformed Water Patrol in the MSEP

Members Retiring During Fiscal Year		Years Credited Service by Category							All Members
		<5	5-10	11-15	16-20	21-25	26-30	31+	
2007	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
	Average final average salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
	Number of retirees	0	0	0	0	0	0	0	0
2008	Average monthly benefit	\$ 0	\$ 0	\$ 750	\$ 0	\$ 0	\$ 0	\$ 0	\$ 750
	Average final average salary	\$ 0	\$ 0	\$ 2,541	\$ 0	\$ 0	\$ 0	\$ 0	\$ 2,541
	Number of retirees	0	0	1	0	0	0	0	1
2009	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 5,113	\$ 5,113
	Average final average salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 7,902	\$ 7,902
	Number of retirees	0	0	0	0	0	0	1	1
2010	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 4,886	\$ 4,886
	Average final average salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 7,184	\$ 7,184
	Number of retirees	0	0	0	0	0	0	2	2
2011	Average monthly benefit	\$ 0	\$ 0	\$ 721	\$ 0	\$ 0	\$ 3,086	\$ 4,553	\$ 3,200
	Average final average salary	\$ 0	\$ 0	\$ 2,964	\$ 0	\$ 0	\$ 5,077	\$ 6,912	\$ 5,388
	Number of retirees	0	0	1	0	0	2	2	5
2012	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 959	\$ 0	\$ 0	\$ 0	\$ 959
	Average final average salary	\$ 0	\$ 0	\$ 0	\$ 2,794	\$ 0	\$ 0	\$ 0	\$ 2,794
	Number of retirees	0	0	0	1	0	0	0	1
2013	Average monthly benefit	\$ 0	\$ 69	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 69
	Average final average salary	\$ 0	\$ 1,291	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 1,291
	Number of retirees	0	1	0	0	0	0	0	1
2014	Average monthly benefit	\$ 0	\$ 0	\$ 780	\$ 0	\$ 0	\$ 0	\$ 0	\$ 780
	Average final average salary	\$ 0	\$ 0	\$ 2,507	\$ 0	\$ 0	\$ 0	\$ 0	\$ 2,507
	Number of retirees	0	0	1	0	0	0	0	1
2015	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 4,539	\$ 4,539
	Average final average salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 6,321	\$ 6,321
	Number of retirees	0	0	0	0	0	0	1	1
2016	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 4,221	\$ 4,221
	Average final average salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 6,375	\$ 6,375
	Number of retirees	0	0	0	0	0	0	2	2
Ten Years Ended June 30, 2016									
	Average monthly benefit	\$ 0	\$ 69	\$ 750	\$ 959	\$ 0	\$ 3,086	\$ 4,622	\$ 3,095
	Average final average salary	\$ 0	\$ 1,291	\$ 2,671	\$ 2,794	\$ 0	\$ 5,077	\$ 6,896	\$ 5,161
	Number of retirees	0	1	3	1	0	2	8	15

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, 2016

## Administrative Law Judges and Legal Advisors in the MSEP

Members Retiring During Fiscal Year		Years Credited Service by Category							All Members
		<5	5-10	11-15	16-20	21-25	26-30	31+	
2007	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
	Average final average salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
	Number of retirees	0	0	0	0	0	0	0	0
2008	Average monthly benefit	\$ 0	\$ 0	\$ 2,040	\$ 3,843	\$ 0	\$ 0	\$ 0	\$ 2,641
	Average final average salary	\$ 0	\$ 0	\$ 4,081	\$ 7,936	\$ 0	\$ 0	\$ 0	\$ 5,366
	Number of retirees	0	0	2	1	0	0	0	3
2009	Average monthly benefit	\$ 0	\$ 0	\$ 0	\$ 0	\$ 4,200	\$ 0	\$ 0	\$ 4,200
	Average final average salary	\$ 0	\$ 0	\$ 0	\$ 0	\$ 8,400	\$ 0	\$ 0	\$ 8,400
	Number of retirees	0	0	0	0	2	0	0	2
2010	Average monthly benefit	\$ 823	\$ 0	\$ 2,827	\$ 0	\$ 0	\$ 0	\$ 0	\$ 2,159
	Average final average salary	\$ 8,172	\$ 0	\$ 5,851	\$ 0	\$ 0	\$ 0	\$ 0	\$ 6,625
	Number of retirees	1	0	2	0	0	0	0	3
2011	Average monthly benefit	\$ 0	\$ 0	\$ 3,236	\$ 4,101	\$ 0	\$ 0	\$ 0	\$ 3,524
	Average final average salary	\$ 0	\$ 0	\$ 6,433	\$ 8,202	\$ 0	\$ 0	\$ 0	\$ 7,023
	Number of retirees	0	0	2	1	0	0	0	3
2012	Average monthly benefit	\$ 0	\$ 2,493	\$ 0	\$ 4,378	\$ 0	\$ 4,204	\$ 0	\$ 3,692
	Average final average salary	\$ 0	\$ 8,756	\$ 0	\$ 8,756	\$ 0	\$ 8,408	\$ 0	\$ 8,640
	Number of retirees	0	1	0	1	0	1	0	3
2013	Average monthly benefit	\$ 0	\$ 0	\$ 2,657	\$ 0	\$ 4,134	\$ 0	\$ 4,450	\$ 3,747
	Average final average salary	\$ 0	\$ 0	\$ 5,314	\$ 0	\$ 8,267	\$ 0	\$ 8,900	\$ 7,494
	Number of retirees	0	0	1	0	1	0	1	3
2014	Average monthly benefit	\$ 0	\$ 2,433	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 2,433
	Average final average salary	\$ 0	\$ 8,146	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 8,146
	Number of retirees	0	1	0	0	0	0	0	1
2015	Average monthly benefit	\$ 0	\$ 2,259	\$ 0	\$ 3,012	\$ 0	\$ 0	\$ 0	\$ 2,636
	Average final average salary	\$ 0	\$ 7,936	\$ 0	\$ 6,023	\$ 0	\$ 0	\$ 0	\$ 6,980
	Number of retirees	0	1	0	1	0	0	0	2
2016	Average monthly benefit	\$ 0	\$ 853	\$ 0	\$ 0	\$ 3,811	\$ 0	\$ 0	\$ 3,072
	Average final average salary	\$ 0	\$ 3,508	\$ 0	\$ 0	\$ 7,623	\$ 0	\$ 0	\$ 6,594
	Number of retirees	0	1	0	0	3	0	0	4
Ten Years Ended June 30, 2016									
	Average monthly benefit	\$ 823	\$ 2,010	\$ 2,695	\$ 3,834	\$ 3,995	\$ 4,204	\$ 4,450	\$ 3,153
	Average final average salary	\$ 8,172	\$ 7,087	\$ 5,435	\$ 7,729	\$ 7,989	\$ 8,408	\$ 8,900	\$ 7,113
	Number of retirees	1	4	7	4	6	1	1	24

Note: COLA increases are excluded from the above for comparison purposes.

## Average Monthly Benefit Amounts | Ten Years Ended June 30, 2016

### Judicial Plan

Members Retiring During Fiscal Year		Years Credited Service by Category							All Members
		<5	5-10	11-15	16-20	21-25	26-30	31+	
2007	Average monthly benefit	\$ 375	\$ 2,121	\$ 3,995	\$ 4,243	\$ 4,390	\$ 4,083	\$ 4,167	\$ 3,842
	Average final average salary	\$ 9,000	\$ 7,889	\$ 7,990	\$ 8,486	\$ 8,833	\$ 8,167	\$ 8,333	\$ 8,355
	Number of retirees	1	5	5	14	6	6	3	40
2008	Average monthly benefit	\$ 381	\$ 2,045	\$ 4,120	\$ 4,805	\$ 5,132	\$ 4,593	\$ 5,186	\$ 4,033
	Average final average salary	\$ 2,742	\$ 6,203	\$ 8,276	\$ 9,611	\$ 10,264	\$ 9,186	\$ 10,373	\$ 8,445
	Number of retirees	1	2	6	2	3	2	1	17
2009	Average monthly benefit	\$ 524	\$ 1,786	\$ 3,663	\$ 4,693	\$ 5,286	\$ 5,342	\$ 5,020	\$ 3,336
	Average final average salary	\$ 6,103	\$ 7,469	\$ 7,811	\$ 9,336	\$ 10,572	\$ 10,684	\$ 10,040	\$ 8,257
	Number of retirees	6	2	7	6	3	1	1	26
2010	Average monthly benefit	\$ 458	\$ 1,333	\$ 4,507	\$ 4,557	\$ 0	\$ 5,342	\$ 4,973	\$ 3,958
	Average final average salary	\$ 6,597	\$ 8,000	\$ 9,577	\$ 9,114	\$ 0	\$ 10,684	\$ 9,946	\$ 9,265
	Number of retirees	1	1	2	1	0	1	3	9
2011	Average monthly benefit	\$ 0	\$ 2,188	\$ 4,631	\$ 4,542	\$ 4,869	\$ 4,789	\$ 4,650	\$ 4,343
	Average final average salary	\$ 0	\$ 7,994	\$ 9,322	\$ 9,031	\$ 9,738	\$ 9,577	\$ 9,299	\$ 9,139
	Number of retirees	0	4	8	9	4	2	5	32
2012	Average monthly benefit	\$ 0	\$ 2,353	\$ 4,561	\$ 4,621	\$ 0	\$ 5,020	\$ 0	\$ 3,822
	Average final average salary	\$ 0	\$ 7,797	\$ 10,179	\$ 9,241	\$ 0	\$ 10,040	\$ 0	\$ 9,050
	Number of retirees	0	5	4	4	0	1	0	14
2013	Average monthly benefit	\$ 0	\$ 2,777	\$ 4,234	\$ 4,625	\$ 5,444	\$ 5,452	\$ 5,293	\$ 4,832
	Average final average salary	\$ 0	\$ 8,246	\$ 8,696	\$ 9,251	\$ 10,888	\$ 10,904	\$ 10,585	\$ 9,848
	Number of retirees	0	1	6	4	5	4	2	22
2014	Average monthly benefit	\$ 0	\$ 2,310	\$ 4,571	\$ 5,151	\$ 5,117	\$ 4,869	\$ 5,293	\$ 4,313
	Average final average salary	\$ 0	\$ 8,259	\$ 9,143	\$ 10,303	\$ 10,233	\$ 9,738	\$ 10,585	\$ 9,435
	Number of retirees	0	4	6	3	3	1	1	18
2015	Average monthly benefit	\$ 1,114	\$ 3,140	\$ 5,572	\$ 5,572	\$ 5,970	\$ 5,572	\$ 5,848	\$ 5,392
	Average final average salary	\$ 11,143	\$ 9,419	\$ 11,143	\$ 11,143	\$ 11,940	\$ 11,143	\$ 11,697	\$ 11,253
	Number of retirees	1	3	7	10	7	4	7	39
2016	Average monthly benefit	\$ 0	\$ 4,193	\$ 5,575	\$ 5,452	\$ 6,166	\$ 5,844	\$ 0	\$ 5,545
	Average final average salary	\$ 0	\$ 11,688	\$ 11,503	\$ 10,903	\$ 12,332	\$ 11,688	\$ 0	\$ 11,569
	Number of retirees	0	2	3	5	4	2	0	16
Ten Years Ended June 30, 2016									
	Average monthly benefit	\$ 547	\$ 2,412	\$ 4,504	\$ 4,793	\$ 5,317	\$ 4,984	\$ 5,117	\$ 4,378
	Average final average salary	\$ 6,610	\$ 8,230	\$ 9,227	\$ 9,573	\$ 10,643	\$ 9,968	\$ 10,234	\$ 9,465
	Number of retirees	10	29	54	58	35	24	23	233

Note: COLA increases are excluded from the above for comparison purposes.

**Retirees and Beneficiaries****Tabulated by Fiscal Year of Retirement | As of June 30, 2016****MSEP**

Fiscal Year of Retirement	Number	Total Annual Benefit	Average Monthly Benefit
1974	2	\$ 10,546	\$ 439
1975	1	891	74
1976	5	20,482	341
1977	8	82,131	856
1978	13	67,525	433
1979	13	78,766	505
1980	14	104,837	624
1981	30	278,289	773
1982	32	298,120	776
1983	30	353,533	982
1984	56	537,258	799
1985	83	855,918	859
1986	115	1,123,481	814
1987	136	1,562,085	957
1988	182	2,507,977	1,148
1989	227	3,639,992	1,336
1990	232	3,357,466	1,206
1991	329	5,819,546	1,474
1992	358	5,728,326	1,333
1993	482	7,820,705	1,352
1994	463	7,760,784	1,397
1995	639	11,137,216	1,452
1996	676	12,297,511	1,516
1997	708	12,639,955	1,488
1998	860	15,824,127	1,533
1999	977	18,195,163	1,552
2000	1,073	19,830,992	1,540
2001	2,151	38,777,591	1,502
2002	1,519	23,898,465	1,311
2003	1,636	27,146,333	1,383
2004	2,209	34,987,458	1,320
2005	1,611	23,545,015	1,218
2006	1,795	25,070,636	1,164
2007	2,114	30,632,287	1,208
2008	2,131	30,358,215	1,187
2009	2,238	32,192,683	1,199
2010	2,331	32,617,062	1,166
2011	2,971	44,013,047	1,235
2012	2,768	38,447,349	1,157
2013	2,872	38,802,948	1,126
2014	2,895	38,983,633	1,122
2015	3,218	45,885,994	1,188
2016	3,135	44,933,187	1,194
	45,338	\$682,225,525	\$1,254

**Retirees and Beneficiaries****Tabulated by Fiscal Year of Retirement | As of June 30, 2016****Judicial Plan**

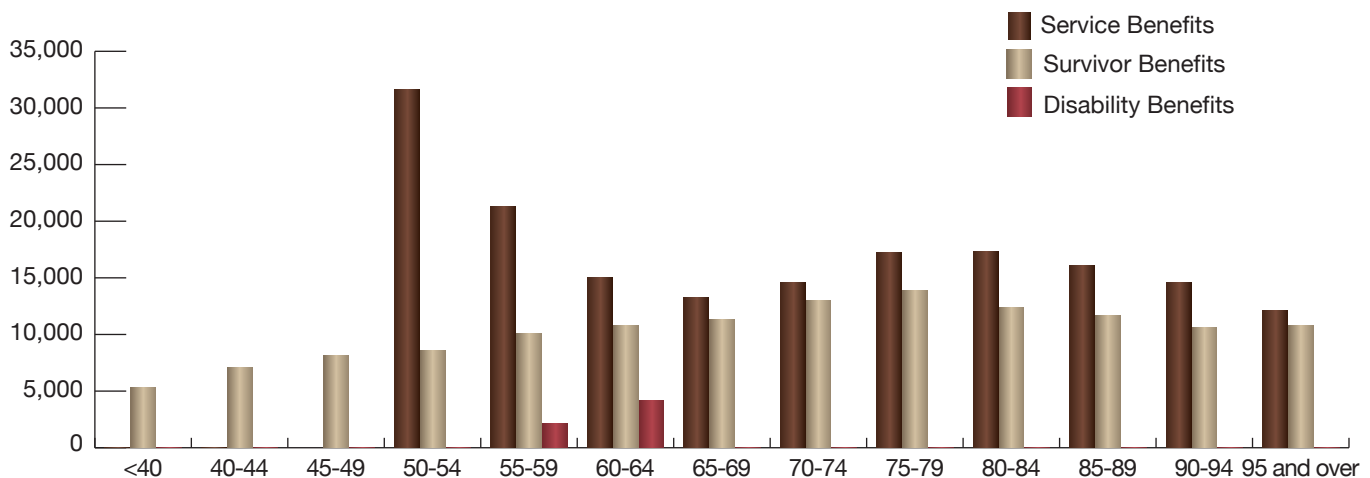
Fiscal Year of Retirement	Number	Total Annual Benefit	Average Monthly Benefit
1976 & prior	1	\$ 11,103	\$ 925
1977	0	0	0
1978	1	15,930	1,327
1979	0	0	0
1980	1	21,723	1,810
1981	1	65,790	5,483
1982	0	0	0
1983	1	21,337	1,778
1984	1	22,678	1,890
1985	0	0	0
1986	1	27,240	2,270
1987	7	347,902	4,142
1988	3	160,074	4,446
1989	6	357,990	4,972
1990	5	266,449	4,441
1991	10	445,424	3,712
1992	4	216,049	4,501
1993	6	264,621	3,675
1994	5	291,289	4,855
1995	13	950,813	6,095
1996	7	322,672	3,841
1997	5	323,392	5,390
1998	19	1,170,219	5,133
1999	15	956,769	5,315
2000	16	1,085,152	5,652
2001	15	1,277,151	7,095
2002	14	993,354	5,913
2003	21	1,423,159	5,647
2004	16	1,020,819	5,317
2005	15	1,150,824	6,393
2006	17	767,629	3,763
2007	53	3,225,520	5,072
2008	27	1,548,986	4,781
2009	34	1,784,441	4,374
2010	14	792,127	4,715
2011	39	2,280,447	4,873
2012	20	957,865	3,991
2013	31	1,964,321	5,280
2014	24	1,362,666	4,731
2015	56	3,691,554	5,493
2016	25	1,518,646	5,062
	549	\$33,104,125	\$ 5,025



**Total Benefits Payable****Tabulated by Attained Ages of Benefit Recipients | As of June 30, 2016****MSEP**

Attained Ages	Service Retirement		Disability Retirement		Survivors and Beneficiaries		Totals	
	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits
Under 20					73	\$ 247,204	73	\$ 247,204
20-24					14	80,398	14	80,398
25-29					9	88,128	9	88,128
30-34					21	131,055	21	131,055
35-39					40	290,137	40	290,137
40-44					73	516,535	73	516,535
45-49	5	\$ 150,012			146	1,186,130	151	1,336,142
50-54	477	15,106,270			213	1,825,386	690	16,931,656
55-59	3,491	74,397,774	1	\$ 2,184	346	3,495,483	3,838	77,895,441
60-64	8,500	128,027,998	3	12,456	496	5,361,433	8,999	133,401,887
65-69	10,929	145,196,729			733	8,299,051	11,662	153,495,780
70-74	7,030	102,823,394			668	8,685,888	7,698	111,509,282
75-79	4,393	75,781,927			708	9,846,185	5,101	85,628,112
80-84	2,664	46,120,440			721	8,959,210	3,385	55,079,650
85-89	1,498	24,111,937			494	5,763,461	1,992	29,875,398
90-94	640	9,344,076			221	2,356,798	861	11,700,874
95	56	615,580			16	190,392	72	805,972
96	38	451,125			13	97,522	51	548,647
97	36	451,168			5	97,901	41	549,069
98	12	224,904			7	90,864	19	315,768
99	8	107,292			1	19,260	9	126,552
100	8	97,526			4	10,524	12	108,050
101	4	59,904			2	17,760	6	77,664
102	5	45,984					5	45,984
103	3	11,560			1	3,672	4	15,232
104	2	14,388					2	14,388
Totals	39,799	\$623,139,988	4	\$14,640	5,025	\$57,660,377	44,828	\$680,815,005

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

**MSEP | Average Annual Benefits**

Average benefit paid: \$15,657 service benefits • \$11,475 survivor benefits • \$3,660 disability benefits

## Total Benefits Payable

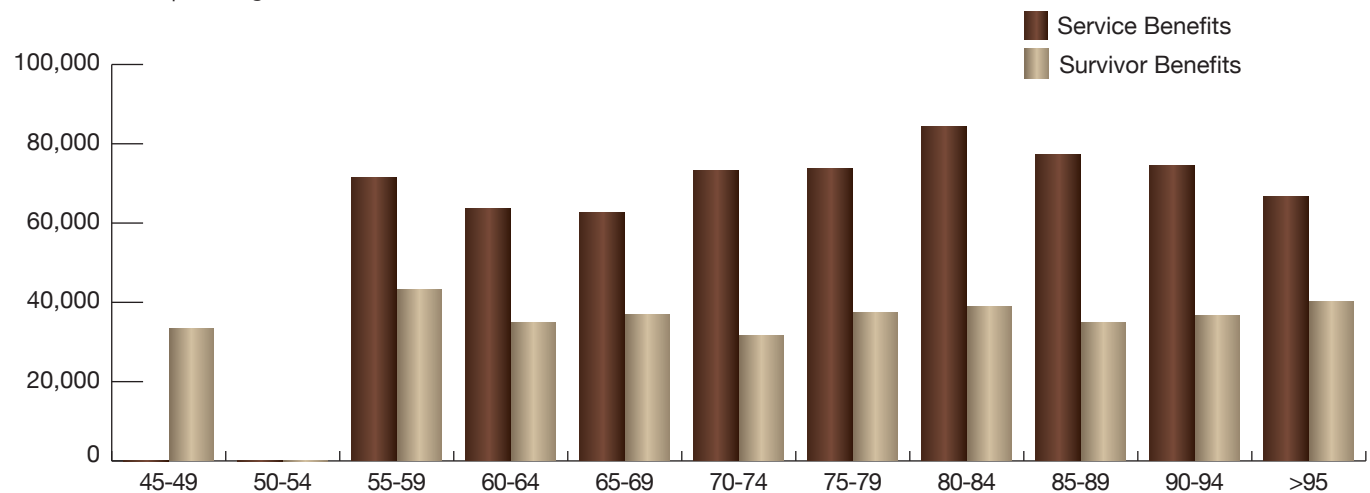
### Tabulated by Attained Ages of Benefit Recipients | As of June 30, 2016

#### Judicial Plan

Attained Ages	Service Retirement		Survivors and Beneficiaries		Totals	
	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits
45-49			1	\$ 33,459	1	\$ 33,459
50-54					0	0
55-59	3	\$ 214,800	4	173,256	7	388,056
60-64	45	2,870,353	6	210,553	51	3,080,906
65-69	99	6,202,139	14	519,133	113	6,721,272
70-74	98	7,188,006	21	664,958	119	7,852,964
75-79	62	4,578,381	20	751,738	82	5,330,119
80-84	37	3,125,271	18	703,081	55	3,828,352
85-89	30	2,322,313	40	1,400,933	70	3,723,246
90-94	12	894,780	16	588,106	28	1,482,886
95+	7	466,776	7	281,796	14	748,572
Totals	393	\$27,862,819	147	\$5,327,013	540	\$33,189,832

Average age at retirement: 65.0 years • Average age now: 74.8 years

#### Judicial Plan | Average Annual Benefits



Average benefit paid: \$70,898 service benefits • \$36,238 survivor benefits

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