



*Serving those who keep us safe.*

Scott Simon, Executive Director  
Jennifer Even, Chief Financial Officer  
1913 William Street, PO Box 1930  
Jefferson City, MO 65102-1930  
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# The Road to Retirement

Comprehensive Annual Financial Report

For the Fiscal Years Ended June 30, 2017

**2017**

Missouri Department of Transportation and  
Highway Patrol Employees' Retirement System  
A Component Unit of the State of Missouri

All photos courtesy of MoDOT unless otherwise noted

# MoDOT and Patrol Employees' Retirement System



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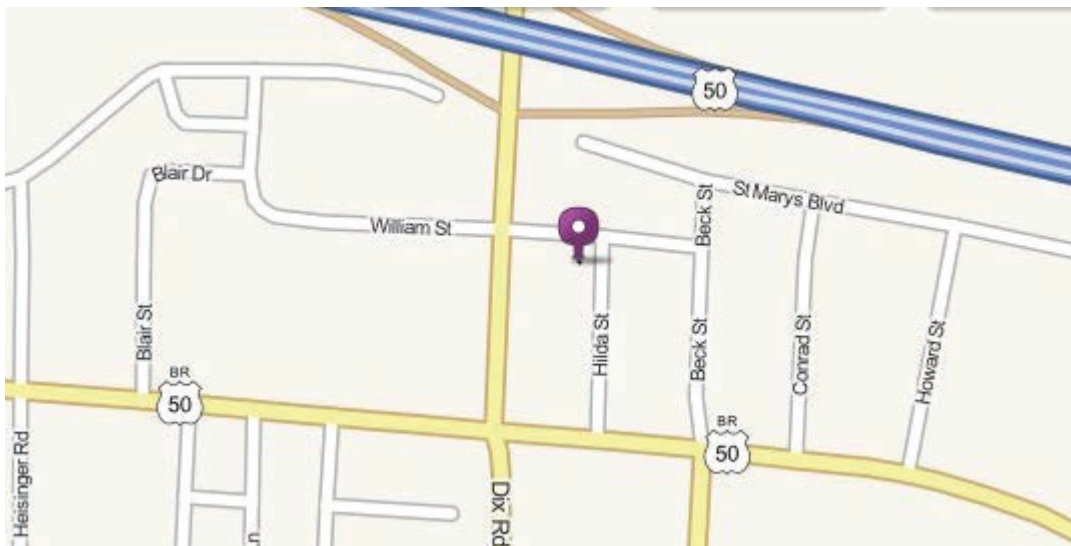
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# Notes

## **Navigating curves in retirement**

can be as daunting as racing through hairpin turns, but if you have a good retirement plan in place, the journey to retirement will be more like a leisurely Sunday drive. A good basic retirement plan is to save at least 10% of your take home pay, attend MPERS pre-retirement seminars, and carefully consider when to take Social Security benefits.

# Certificate of Achievement for Excellence in Financial Reporting



Government Finance Officers Association

## Certificate of Achievement for Excellence in Financial Reporting

Presented to

**Missouri Department of Transportation  
and Highway Patrol  
Employees' Retirement System**

For its Comprehensive Annual  
Financial Report  
for the Fiscal Year Ended

**June 30, 2016**

Executive Director/CEO



# Public Pension Coordinating Council Award



Public Pension Coordinating Council

## ***Public Pension Standards Award For Funding and Administration 2017***

Presented to

### ***MoDOT and Patrol Employees' Retirement System***

In recognition of meeting professional standards for  
plan funding and administration as  
set forth in the Public Pension Standards.

*Presented by the Public Pension Coordinating Council, a confederation of*

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

A handwritten signature in black ink that reads "Alan H. Winkle". The signature is fluid and cursive, with the first name being the most prominent.

Alan H. Winkle  
Program Administrator

# Letter of Transmittal



## MoDOT & Patrol Employees' Retirement System

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November 8, 2017

To the Board of Trustees and System Members:

We are pleased to provide this *Comprehensive Annual Financial Report (CAFR)*, of the Missouri Department of Transportation and Highway Patrol Employees' Retirement System (MPERS), for the fiscal year ending June 30, 2017. This report is intended to provide MPERS' stakeholders with a thorough review of the System's operations for the past fiscal year. The material presented in this report has been prepared in a manner intended to be useful and informative to MPERS' members, the management of the Missouri Department of Transportation (MoDOT) and the Missouri State Highway Patrol (MSHP), and the elected officials of the state of Missouri.

MPERS is a defined benefit pension plan designed to be a valuable recruitment and retention tool for covered employers. It provides lifetime retirement benefits to eligible MoDOT and MSHP employees. The monthly retirement and survivor benefits provided by MPERS are a valuable source of retirement income for the members we serve. These benefits, when combined with social security and personal savings, provide the basic foundation for our members to leave the workforce and enjoy their retirement years with the dignity they deserve.

The average monthly benefit of a new MPERS retiree in FY2017 retiring directly from active employment was \$2,546, which equates to \$30,552 per year. Given the increasing cost of living, this amount alone will not provide a life of luxury for the retiree. However, this monthly benefit and those provided by other traditional pension plans have a significant impact that reaches beyond the retirees served. Over the past 10 years alone, MPERS has paid over \$2.1 billion in benefit payments to its members. Nearly 95% of these retirees and beneficiaries reside in Missouri; reinvesting their retirement dollars in housing, goods, and services. This reinvestment improves the local economy which in turn, helps to fuel the state's overall economy. The result is that defined benefit pensions have a long-term positive impact on our economy and the lives of our members.

### Report Contents and Structure:

This CAFR is designed to comply with the statutory reporting requirements stipulated in sections 104.190, 104.1006, and 105.661 of the Revised Statutes of Missouri (RSMo), as amended.

To the best of our knowledge, the information presented is accurate in all material respects and is reported in a manner designed to fairly represent the financial position of the fund. Some amounts included in the financial statements and elsewhere may be based on estimates and judgments. These estimates and judgments were products of best business practices. 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 information displayed in the basic financial statements.

The MPERS Board of Trustees (Board) is ultimately responsible for the CAFR and the basic financial statements. MPERS' executive director and staff prepare the information contained in the CAFR and the financial statements to assist the board in fulfilling its statutory duty.

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. Inherent limitations exist in all control systems. No evaluation of controls can provide absolute assurance that misstatements due to error or fraud will not occur or that all control issues and instances of fraud have been detected. The objective of internal controls is to provide reasonable assurance the financial statements are free of any material misstatements, recognizing that the cost of a control should not exceed the benefits to be derived.

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**Website:** [www.mpers.org](http://www.mpers.org) • **E-Mail:** [mpers@mpers.org](mailto:mpers@mpers.org)

# Letter of Transmittal

In accordance with section 104.190, RSMo, as amended, an independent auditing firm, Williams-Keepers, LLC, has audited the financial statements included in this report and has issued an unqualified opinion (i.e., no audit concerns relating to MPERS' financial statements). The opinion letter of Williams-Keepers, LLC is presented in the Financial Section of this CAFR. Management's Discussion and Analysis (MD & A) immediately follows the Independent Auditors' Report and provides a narrative introduction, overview, and analysis of the basic financial statements. Management's Discussion and Analysis complements this letter of transmittal.

## **Background Information:**

MPERS was established by Senate Bill 66 in the 68th General Assembly. In accordance with this legislation, employees of MoDOT and the MSHP became members of the retirement system on September 1, 1955. Effective October 1, 1955, the System accepted 109 retirements.

The plan provisions have changed many times over the years. The System offers not only enhanced retirement and disability benefits, but also benefits for survivors of active and retired members, benefits for vested former members, and death benefits.

Our 11-member Board is responsible for the oversight of MPERS. The trustees serve as fiduciaries to the members and are responsible for selecting and retaining competent management. The trustees and management jointly establish sound policies and objectives, monitor operations for compliance, and oversee performance.

MPERS 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's Comprehensive Annual Financial Report.

## **Fiscal Year 2017 Highlights:**

The emphasis on our risk management efforts from last year carried forward to this year. An Enterprise Risk Management policy was completed to reinforce the importance of this issue for staff and to define the overarching purpose it serves in our daily operation. In addition to this policy, we completed a risk/control document identifying the various risks associated with our operation along with the corresponding control intended to manage that risk effectively. Along the lines of risk management we also incorporated new software associated with the MPERS website that provides additional security to the confidential information we are entrusted to protect. We have also successfully completed disaster recovery exercises, including extensive backup generator testing that will support our business continuity efforts and allow us to issue benefit payments when unplanned events or disasters occur. On the investment side of the operation, we have established the reporting framework to assist staff with identifying risks with the portfolio. These efforts and many more encompass our risk management efforts that help us fulfill the "good stewardship" expectations our members and stakeholders have of the System.

Late in the year, the Board approved the addition of a part-time financial officer to assist the chief financial officer (CFO) with the extensive responsibilities connected to that department. Prior to this addition, the accounting department was a one-person operation. Even though our CFO managed to complete the vast number of responsibilities with the high standards expected with our operation, we had difficulty identifying and applying enhancements and efficiencies given the time constraints of that one individual. There was also considerable risk presented with the one-person department in terms of business continuity, should, for any reason, the CFO be unable to work. With the additional time dedicated to these responsibilities we expect to become more efficient with our reporting demands and to produce more transparency for our stakeholders in the process.

As an important recruitment and retention tool for our covered employers, it is important that our membership is aware and understands the benefits MPERS provides. A number of tools are utilized to support those efforts, with newsletters becoming more prominent in our efforts. Previously, we produced newsletters sporadically as time permitted. Starting this fiscal year and going forward, we have dedicated ourselves to delivering two newsletters each to both our active employee and retiree populations. This commitment should improve our communication efforts and enhance the value of our benefits to our members. A more modern tool that was added to our tool chest in recent years is the webinar. We now have in place a library of webinars for a variety of basic topics. These 30-minute productions allow members round-the-clock access to important information. We plan to add more topically specific webinars in the coming year.

Transparency continues to be a point of emphasis for essentially any governmental operation. With that in mind, MPERS has taken strides to become more transparent this past year. The FYI brochure we have produced for some time represents an easily understood summary document explaining some basic historical details of the System, important funding decisions, and of course details on benefits provided. In addition to that information, we now include various financial reporting details. This consolidated information provides accessibility to information in a format much more likely to be read by our stakeholders. We also added a webinar to our library that provided an overview of how the system is funded.

# Letter of Transmittal

## **Actuarial Funding Status:**

The funding objective of MPERS is to meet future benefit obligations of retirees and beneficiaries through investment earnings and payroll contributions that remain approximately level from generation to generation. Historical information relating to this objective is presented in the Schedule of Funding Progress in the Actuarial Section of this report. During the year ending June 30, 2017, the funded ratio of MPERS, which covers 18,646 participants, remained stable with a slight increase to 57.14%, as our positive investment returns for FY2017, coupled with liability gains, helped to offset the investment loss from the previous year.

Each year an independent actuarial firm conducts a valuation study to determine the actuarial soundness of the Plan, based on its long-term obligations and the sufficiency of current contribution levels to fund the liabilities over a reasonable timeframe. In our most recent valuation dated June 30, 2017, our actuary concluded that the System continues to be financed in accordance with actuarial standards using the level percent of payroll financing method. The actuary's conclusion is based upon the fact that the employers are contributing to the System according to actuarially determined rates and presumes the continuation of payment of actuarially determined contributions. Additional information regarding the financial condition of the System can be found in the Actuarial Section of this report.

In an effort to address the System's underfunding situation, in September 2006, the Board adopted a permanent funding policy that was intended to improve MPERS' funded status over a shorter timeframe.

The permanent funding policy states:

- The total contribution is based on the Plan's normal cost with a 29-year amortization period for MPERS' unfunded actuarial accrued liabilities. The financing period is a closed period that started July 1, 2007.

On September 17, 2009, after the Great Recession, the Board adopted the following temporary accelerated funding policy:

- The total contribution is based on the Plan's normal cost with a 15-year amortization period for unfunded retiree liabilities and a 30-year amortization period for other unfunded liabilities. Both amortization periods are closed periods that started July 1, 2010.
- The temporary accelerated funding policy will remain in effect until such time as the retiree liability becomes 100% funded or the permanent funding policy produces a higher contribution rate.

On September 24, 2014, the Board adopted a Rate Stabilization Reserve Fund intended to further reinforce the aggressive funding policies noted in the temporary policy above. The reserve fund was developed by maintaining employer contribution rates at present levels by applying investment gains to the reserve fund rather than decreasing employer contribution rates. When losses are experienced the reserve fund would be used first rather than increasing employer contribution rates. The reserve fund provides a smoothing of our overall experience that further decreases the potential volatility of contributions for our covered employers.

As of June 30, 2017, the permanent funding policy is at a closed amortization period of 18 years and the temporary accelerated funding policy is at a closed amortization period of 7 years for unfunded retiree liabilities and 22 years for other unfunded liabilities.

## **Investment Activities:**

State statutes require the System to make investments using the same care, skill, and diligence that a prudent person acting in a similar capacity would use. In fulfilling this obligation, the Board has established a formal investment policy to clearly define the roles and responsibilities of the Board, staff and consultants, and to ensure that System assets are invested in a diversified portfolio following prudent investment standards. The Board determines the broad asset allocation policies and return objectives of the Plan. To implement and execute these policies, the Board retains investment staff, consultants, a master custodian, and other advisors.

As of June 30, 2017, MPERS' investment portfolio had a total market value of \$2.16 billion, representing a return of 11.22% for the fiscal year. The portfolio continues to perform well versus the peer universe, particularly over longer periods. Relative to our peer group, the 11.22% return for FY2017 ranked MPERS in the 64th percentile, outpacing 36% of other public funds within the universe. The trailing three-year and five-year performance of 6.20% and 9.82%, respectively, ranks MPERS in the top 5% and 6%, respectively, of the peer universe. The trailing 10-year performance of 5.19% ranks MPERS in the top 43% of the universe.

## **Awards:**

The Government Finance Officer Association of the United States and Canada (GFOA) awarded a Certificate of Achievement for Excellence in Financial Reporting to MPERS for its FY2016 CAFR. This was the 12th consecutive year that MPERS has achieved this prestigious award. The Certificate of Achievement is the highest form of recognition for

# Letter of Transmittal

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 CAFR. This report must satisfy both generally accepted accounting principles and applicable legal and GFOA reporting requirements.

A Certificate of Achievement is valid for a period of one year. We believe that our current CAFR continues to meet the program's requirements, and therefore, we are submitting this report to GFOA to determine its eligibility for another certificate.

MPERS also received the Public Pension Coordinating Council's (PPCC) Public Pension Standards Award in recognition of meeting professional standards for plan design and administration. This is the 13th consecutive year MPERS received the Council's award. 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).

### **Acknowledgements and Distribution:**

This report, prepared by the MPERS executive director and staff, is intended to provide comprehensive and reliable information about the System, to demonstrate compliance with legal provisions and to allow for the evaluation of responsible stewardship of the System's funds.

This report is provided to the Governor, the State Auditor, and the Joint Committee on Public Employee Retirement. It is also distributed electronically to all MoDOT divisions, district offices, MSHP general headquarters, and troop headquarters. These offices form the link between MPERS and its members, and their cooperation contributes significantly to the success of MPERS. We hope all readers of this report find it informative and useful. An electronic version of this report is available on the MPERS' website at [www.mpers.org](http://www.mpers.org).

We express our gratitude to the members of the board, the staff, the consultants, and the many people who have worked so diligently to assure the continued successful operation of MPERS. The steady, monthly benefit payments offered by defined benefit plans, like MPERS, provide peace of mind and security for retirees and their families. For over 60 years, MPERS has been committed to providing a foundation for financial security to plan participants through the delivery of quality benefits, exceptional member service and professional plan administration.

Respectfully submitted,



Scott Simon  
Executive Director



Sue Cox  
Board Chair

# Board of Trustees

MPERS is governed by a Board of Trustees. As set out in Section 104.160 of the Revised Statutes of Missouri (RSMo.), the Board is comprised of eleven members:



**Sue Cox**

**Board Chair  
MoDOT Retiree  
Representative**

Elected by Retired  
Members of MoDOT  
Term Expires 7-1-2018



**William "Bill" Seibert**

**Board Vice Chair  
MSHP Retiree  
Representative**

Elected by Retired  
Members of MSHP  
Term Expires 7-1-2018



**John Briscoe**

**Commission Member**  
Highways & Transportation  
Commission  
Term Expires 3-1-2021



**Sergeant Matt Broniec**

**MSHP Employee  
Representative**

Elected by MSHP Employees  
Term Expires 7-1-2018



**Colonel Sandra K.  
Karsten**

**Superintendent  
of the Missouri  
State Highway Patrol**

Ex-Officio Member



**Patrick McKenna**

**Director of the Missouri  
Department of  
Transportation**

Ex-Officio Member



**Michael B. Pace**

**Commission Member**  
Highways & Transportation  
Commissioner  
Term Expires 7-1-2019



**Representative  
Shawn Rhoads**

**State Representative**

District 154  
Appointed by  
Speaker of the House



**Senator Dave Schatz**

**State Senator**

District 26  
Appointed by  
President Pro-Tem  
of the Senate



**Gregg Smith**

**Commission Member**

Highways & Transportation  
Commissioner  
Term Expires 3-1-2019



**Todd Tyler**

**MoDOT Employee  
Representative**

Elected by MoDOT Employees  
Term Expires 7-1-2018



# Administrative Organization

## Executive Team



Greta Bassett-Seymour-General Counsel, Larry Krumpfen-Chief Investment Officer, Scott Simon-Executive Director, Greg Beck-Assistant Executive Director, Jennifer Even-Chief Financial Officer

Our Mission is to provide a foundation for financial security to plan participants by delivering quality benefits and exceptional member service through professional plan administration and prudent management of assets, at a reasonable cost to the taxpayers of Missouri.

# Administrative Organization

## **Director's Office**

The Director's Office staff provides executive oversight for the System which includes, but is not limited to administrative support in the areas of legislation, stakeholder communications, operations, benefits, risk management, and investments. The Director's Office is also responsible for providing the Board with information and reports on the activities of the System.

## **Financial Services**

The Financial Services section is responsible for maintaining all the financial records of MPERS. The chief financial officer (CFO) interacts with the investment custodian, the auditors, the depository bank, Missouri's Department of Revenue, and the Internal Revenue Service. In addition, the CFO assists the chief investment officer in tracking and predicting target cash balances, participates in annual budget development, prepares monthly budget-to-actual reports, and calculates monthly premium payments to the long-term disability insurer. The CFO also processes MPERS' semi-monthly office payrolls, reconciles monthly benefit payments and contributions/payrolls posted, and reconciles investment activity.

## **Investments**

The Investments section staff works closely with the general investment consultant to manage the investment portfolio and provide consulting services to the Board and the executive director. This includes, but is not limited to: (a) formulating investment policy and asset recommendations, (b) sourcing, selecting, monitoring, and evaluating external investment advisors, (c) measuring and reporting investment performance, (d) conducting market research on political, financial, and economic developments that may affect the System, and (e) serving as a liaison to the investment community.

## **Legal Services**

The Legal Services section advises the executive director and Board on legal matters, reviews and approves investment and other contracts for MPERS, advises staff on the application of state and federal statutes affecting the administration of plan benefits, responds to requests from members and their attorneys related to plan benefits, engages in or oversees litigation affecting MPERS, and assists in developing policies, rules, and legislation impacting MPERS' operations or the administration of plan benefits.

## **Member Services**

The Member Services section consists of two units devoted to serving member needs.

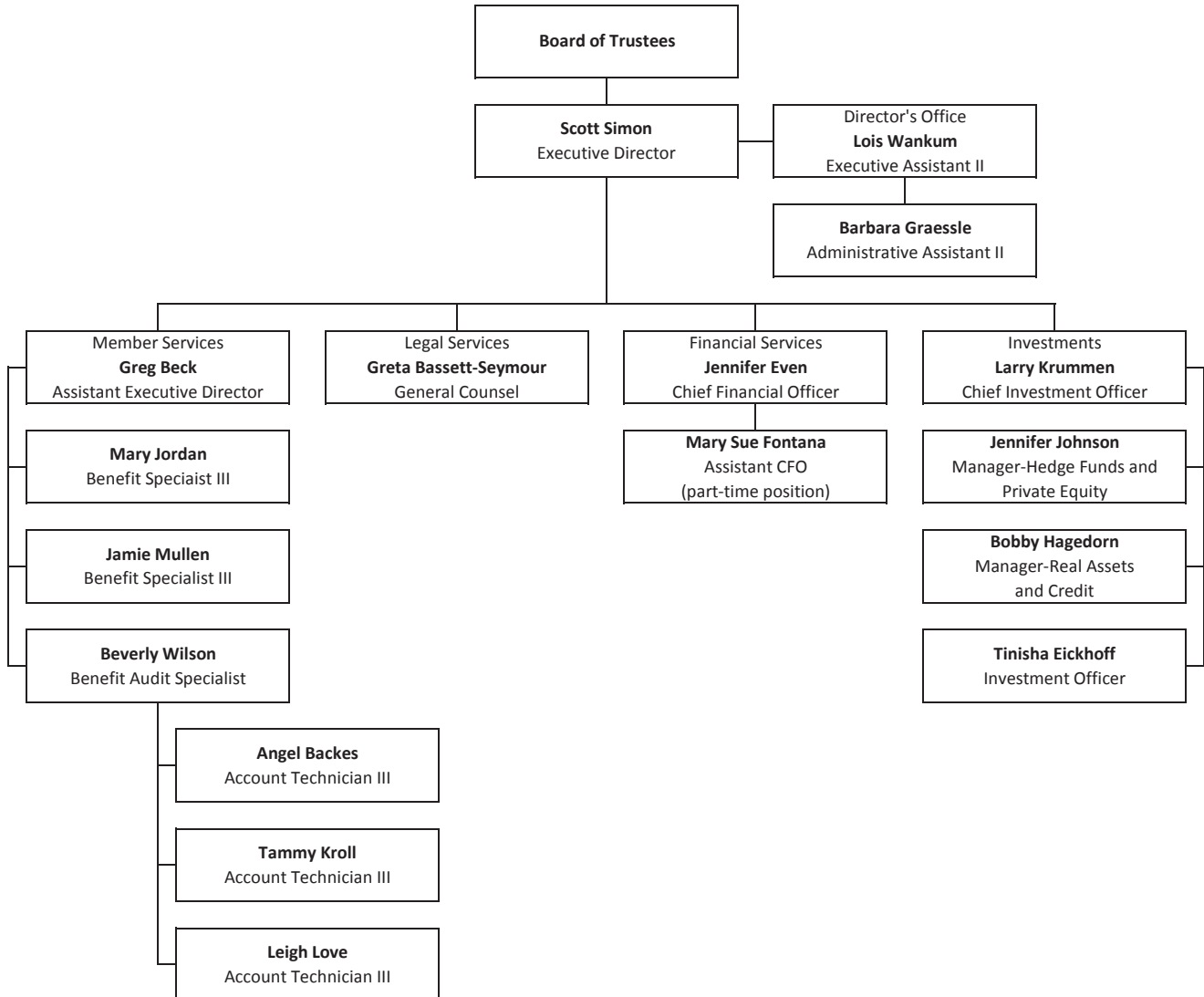
The Benefits Unit is responsible for contact with the membership regarding the benefit programs administered by MPERS, which include retirement and disability. The benefit staff is responsible for preparing and delivering the pre-retirement and benefit basics seminars in addition to assisting with the development of member communication material. The benefit staff is the main point of contact with members who have questions about their retirement.

The Payroll Unit is responsible for establishing and maintaining all membership records including: (a) maintaining member data on the pension administration system, (b) verifying retirement calculations, (c) balancing payroll deductions, (d) verifying SAM II data against exception reports, and (e) entering payroll, service, and leave data into the System's computerized database. Payroll Unit staff will also create and publish communication materials, assist with pre-retirement seminars, provide data to the actuary, as well as reviewing member records for accuracy and completeness.



# Administrative Organization

The executive director of MPERS has charge of the offices and records of the System and hires such employees deemed necessary, subject to the approval of the Board of Trustees. The System employs sixteen full-time and one part-time staff.



# Professional Services

The following firms were retained at fiscal year-end by the Board of Trustees to serve in professional capacities or provide consultant services. Please refer to pages 47 and 48 in the Investment Section for the Schedule of Investment Expenses and Brokerage Commissions for the investment professionals.

## Actuary

Gabriel, Roeder, Smith & Company  
Southfield, Michigan

## Legislative Consultant

Michael G. Winter Consultants, LLC  
Jefferson City, Missouri

## Auditor

Williams-Keepers, LLC  
Jefferson City, Missouri

## Master Trustee/Custodian

The Northern Trust Company  
Chicago, Illinois

## Investment Consultant

NEPC  
Cambridge, Massachusetts

## Risk Management/Insurance Consultant

Charlesworth Benefits  
Overland Park, Kansas

## Information Technology

Levi, Ray & Shoup, Inc.  
Springfield, Illinois

Huber & Associates  
Jefferson City, Missouri

## Long-Term Disability Insurer

The Standard Insurance Company  
Portland, Oregon

# Professional Services

## Investment Managers

Aberdeen Asset Management	Philadelphia, Pennsylvania
ABRY Partners	Boston, Massachusetts
Acadian Asset Management	Boston, Massachusetts
AEW Partners	Boston, Massachusetts
Albourne America	San Francisco, California
Alyeska Investment Group	Chicago, Illinois
American Infrastructure MLP	Foster City, California
Anchorage Capital Group	New York, New York
Apollo Aviation Group	New York, New York
Apollo Real Estate	Miami, Florida
Ares Management	New York, New York
Audax Group	Boston, Massachusetts
Barclays Global Investors	San Francisco, California
BlueCrest Capital Management	St. Peter Port, Guernsey
Blue Road Capital	New York, New York
Brevan Howard	New York, New York
Bridgewater Associates	Westport, Connecticut
BTG Pactual	Atlanta, Georgia
Capital Partners	Norwalk, Connecticut
CarVal Investors (CVI)	Minnetonka, Minnesota
CBRE Investors	Baltimore, Maryland
Cevian Capital Limited	Jersey, Channel Islands
CenterSquare Investment Management (formally Urdang)	Plymouth Meeting, Pennsylvania
Clarion Partners	Jersey, Channel Islands
Colony Capital	Los Angeles, California
Deephaven Capital Management	Minnetonka, Minnesota
EIF Management	Needham, Massachusetts
Energy & Mineral Group	Houston, Texas
Enhanced Investment Technologies (INTECH)	Palm Beach Gardens, Florida
GMO	Boston, Massachusetts
Golden Sciens Marine Investments	New York, New York
Golub Capital	New York, New York
Grove Street Advisors	Wellesley, Massachusetts
Gryphon	Toronto, Canada
GSO Capital Partners	New York, New York
Kennedy Capital	St. Louis, Missouri
Koppenberg	New York, New York
KPS	New York, New York
Luxor Capital	New York, New York
M&G Investments	London, United Kingdom
Metacapital Management	New York, New York
Millennium Management	New York, New York
Monomoy Capital Partners	New York, New York
Natural Gas Partners	Houston, Texas
Ned Davis	Venice, Florida
Northern Shipping	Stamford, Connecticut
Och-Ziff Real Estate	New York, New York
OCP Asia	Singapore
Opengate Capital Partners	Los Angeles, California
Orion Mine Finance Group	New York, New York
Octagon Credit Investors	New York, New York
Ospraie Management	New York, New York
Parametrics	Minneapolis, Minnesota
Partner Fund Management	San Francisco, California
Pfingsten Partners	Chicago, Illinois
Pinnacle Associates	New York, New York
Principal Global Investors	Des Moines, Iowa
RK Capital Management	Denver, Colorado
Ridgewood Energy	Montvale, New Jersey
Shore Capital Partners	Chicago, Illinois
Shoreline Capital	Guangzhou, China
Silchester International Investors Limited	New York, New York
Stark Investments (Shepherd)	Milwaukee, Wisconsin
Taconic Capital Advisors	New York, New York
The Northern Trust Company	Chicago, Illinois
Timberland Investment Resources	Atlanta, Georgia
Torchlight Investors	New York, New York
Tortoise Capital Advisors	Leawood, Kansas
Tristan Capital Partners	London, United Kingdom
ValueAct Capital	San Francisco, California
Vectis Healthcare	Boston, Massachusetts

# Notes



## Dealing with detours

is always a source for confusion and angst. Do not let detours during your working years cause you to miss your retirement goals. Save a little more, spend a little less, and give yourself a little more time to deal with the detours and get back on track.

# Independent Auditors' Report



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www.williamskeepers.com

## INDEPENDENT AUDITORS' REPORT

The Board of Trustees  
Missouri Department of Transportation and  
Highway Patrol Employees' Retirement System

### Report on the Financial Statements

We have audited the accompanying statement of fiduciary net position of the Missouri Department of Transportation and Highway Patrol Employees' Retirement System (the System), as of June 30, 2017, and the related statement of changes in fiduciary net position for the year then ended, and the related notes to the financial statements, which collectively comprise the System's 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 an opinion 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 auditor's 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 System'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 System's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

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

### *Opinion*

In our opinion, the financial statements referred to above present fairly, in all material respects, the fiduciary net position of the System at June 30, 2017, and the changes in fiduciary net position for the year then ended, in conformity with U.S. generally accepted accounting principles.

# Independent Auditors' Report

## **Other Matters**

### ***Required Supplementary Information***

U.S. generally accepted accounting principles require that the management's discussion and analysis on pages 3 through 6 and the schedules of employers' net pension liability, changes in the employers' net pension liability, employers' contributions, investment returns, OPEB funding progress, and related notes on pages 28 through 30 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 an opinion on the financial statements that collectively comprise the System's financial statements as a whole. The introductory, investment, actuarial and statistical sections and the additional information presented on pages 31 through 33 are presented for purposes of additional analysis and are not a required part of the financial statements.

The additional information presented on pages 31 through 33 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. The additional information presented on pages 31 through 33 has been subjected to the auditing procedures applied in the audit of the basic financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the basic financial statements or to the basic financial statements themselves, and other additional procedures in accordance with U.S. generally accepted auditing standards. In our opinion, the additional information presented on pages 31 through 33 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.



November 8, 2017

# Management's Discussion and Analysis

The management of the Missouri Department of Transportation and Highway Patrol Employees' Retirement System (the System, or MPERS) provides this discussion and analysis of the System's financial performance for the fiscal year ended June 30, 2017. While this discussion is intended to summarize the financial status of MPERS, readers should consider this information in conjunction with the information that is furnished in the more detailed financial statements and corresponding notes.

## DESCRIPTION OF BASIC FINANCIAL STATEMENTS

As required by the Governmental Accounting Standards Board (GASB) accounting standards, this financial report consists of Management's Discussion and Analysis (this section), the basic financial statements (including notes to the basic financial statements), and other required supplementary information.

**Financial Statements** report information about MPERS, using accounting methods similar to those used by private-sector companies, by using the economic resources measurement focus and accrual basis of accounting. These statements provide both long-term and short-term information about the System's overall financial status. These statements follow this Management's Discussion and Analysis section:

- The **Statement of Fiduciary Net Position** includes all the System's assets and liabilities, with the difference between the two reported as net position.
- The **Statement of Changes in Fiduciary Net Position** accounts for all the current year's additions (income) and deductions (expenses), regardless of when cash is received or paid.

**Notes to the Financial Statements** are included following the financial statements. The notes to the financial statements provide additional information that is essential for a full understanding of the data provided in the financial statements.

**Required Supplementary Information** follows the notes and further supports the information in the financial statements.

## ANALYSIS OF FINANCIAL POSITION AND RESULTS OF OPERATIONS

Overall, the financial position of MPERS strengthened by \$178 million, reported as the "net increase." This is primarily a result of net appreciation in the fair value of investments for the year ended June 30, 2017. The funded status of the plan showed an increase of 1.67%, primarily due to actuarial gains and MPERS' accelerated funding policy.

The following schedules present summarized comparative data from the System's financial statements for each of the fiscal years ended June 30, 2017 and 2016. Following each schedule is a brief summary providing explanation and analyses of the major reasons for changes in the condensed financial statements.



# Management's Discussion and Analysis

## **Summarized Comparative Statements of Fiduciary Net Position**

	<b>As of June 30, 2017</b>	<b>As of June 30, 2016</b>	<b>% Change 2017/2016</b>
Cash and Receivables	\$ 18,697,840	\$ 20,195,007	-7
Investments	2,162,264,152	1,982,820,836	9
Invested Securities Lending Collateral	56,823,478	51,560,512	10
Capital Assets	1,204,317	1,569,100	-23
<b>Total Assets</b>	<b>2,238,989,787</b>	<b>2,056,145,455</b>	<b>9</b>
Accounts Payable	10,109,326	10,668,117	-5
OPEB Obligation	715,962	680,169	5
Securities Lending Collateral	58,389,459	52,723,223	11
<b>Total Liabilities</b>	<b>69,214,747</b>	<b>64,071,509</b>	<b>8</b>
<b>Net Position</b>	<b>\$ 2,169,775,040</b>	<b>\$ 1,992,073,946</b>	<b>9</b>

The decrease in cash and receivables is primarily attributable to lower accrued investment interest and investment sales receivables as of June 30, 2017. Some fluctuations in this area are normal, based on investment activity.

The System's investments represent the main component of total assets. These investments include holdings of stock, government-sponsored enterprises, bonds, mortgages, real estate, timber, hedge funds, securities lending collateral, limited partnerships, and other fixed income investments. The increase in fair value of investments as of June 30, 2017 is primarily due to favorable market conditions experienced during FY2017. The FY2017 investment return was 11.22% as calculated on a time-weighted rate of return methodology.

Capital assets decreased in FY2017 due to depreciation of existing assets and only minimal purchases of new equipment during the year.

The decrease in accounts payable for FY2017 is primarily attributable to lower investment purchases payable. Some fluctuations in this area are normal, based on investment activity.

The Other Post-Employment Benefit (OPEB) obligation liability of \$715,962 at June 30, 2017 and \$680,169 at June 30, 2016 reflects the System's provision of post-employment health care benefits through its participation in the MoDOT and MSHP Medical and Life Insurance Plan. This plan is an internal service fund of the Missouri Department of Transportation (MoDOT); therefore, assets have not been set aside. With this, the increase from FY2016 to FY2017 is expected.

The largest component of liabilities is securities lending collateral. This represents the amount owed for collateral to be returned as the result of securities lent. The increase in securities lending collateral liability from FY2016 to FY2017 is due to the increase in the fair value of investments. The corresponding securities lending collateral asset is valued at a lower amount than the securities lending collateral liability at June 30, 2017 due to the market value of the securities on loan being less than the collateral value.

The System's total net position was \$2.170 billion at June 30, 2017, a \$178 million increase from the \$1.992 billion at June 30, 2016.

# Management's Discussion and Analysis

## Summarized Comparative Statements of Changes in Fiduciary Net Position

	As of June 30, 2017	As of June 30, 2016	% Change 2017/2016
Contributions	\$ 213,198,963	\$ 205,821,588	4
Net Investment Income	220,301,127	21,432,090	928
Other Income	614	5	12180
<b>Net Additions</b>	<b>433,500,704</b>	<b>227,253,683</b>	<b>91</b>
Benefits	251,284,152	240,176,011	5
Administrative Expenses	4,515,458	4,370,860	3
<b>Total Deductions</b>	<b>255,799,610</b>	<b>244,546,871</b>	<b>5</b>
Net Increase (Decrease)	177,701,094	(17,293,188)	1228
Net Position-Beginning	1,992,073,946	2,009,367,134	-1
<b>Net Position-Ending</b>	<b>\$2,169,775,040</b>	<b>\$1,992,073,946</b>	<b>9</b>

The main component of the changes in contributions to MPERS is employer contributions. In FY2017, the contribution rate for the non-uniformed Highway Patrol and MoDOT decreased by 0.05% and the contribution rate for the uniformed Highway Patrol increased by 0.04% from the FY2016 rates. Even though contribution rates stayed relatively flat, there was an increase in total contributions, primarily attributable to an increase in corresponding employers' payroll.

Net investment income, a primary component of plan additions, resulted in income of \$220 million for FY2017. The income represented an 11.22% return for the fiscal year ended June 30, 2017. In comparison, the FY2016 gain of \$21 million represented an investment return of 1.01%. Annual fluctuations within the broad investment markets are outside of the control of the System and are expected to fluctuate from year to year. The Board of Trustees has approved a diversified asset allocation that, over long periods of time, is expected to realize the assumed actuarial rate of investment return of 7.75%.

Benefits increased primarily due to an increase in the total number of retirees for the years shown.

Administrative expenses increased in FY2017 due to career progression and general increases in the costs of services.

## CURRENTLY KNOWN FACTS AND RECENT EVENTS

Based on the June 30, 2016 actuarial valuation, the Board of Trustees approved no change in the required state contribution rate, effective July 1, 2017. The rate applied to both non-uniformed payroll (MoDOT, civilian patrol, and MPERS) and uniformed patrol payroll remains at 58.00%.

Based on the June 30, 2017 actuarial valuation, the Board of Trustees approved no change in the required state contribution, effective July 1, 2018. The rate applied to both non-uniformed payroll (MoDOT, civilian patrol and MPERS) and uniformed patrol payroll will remain at 58.00%.

# Management's Discussion and Analysis

## CONTACTING THE RETIREMENT SYSTEM'S MANAGEMENT

This financial report is designed to provide a general overview of the System's finances. Questions about this report or requests for additional financial information should be sent to:

PO Box 1930  
Jefferson City, MO 65102-1930  
[mpers@mpers.org](mailto:mpers@mpers.org)

# Statement of Fiduciary Net Position

As of June 30, 2017

## **ASSETS:**

Cash	\$	171,775
Receivables		
Contributions		8,714,163
Accrued Interest and Income		5,686,056
Investment Sales		4,073,357
Other		52,489
Total Receivables		<u>18,526,065</u>
Investments, at Fair Value		
Stocks and Rights/Warrants		358,551,039
Government Obligations		278,549,207
Corporate Bonds		13,954,059
Real Estate		241,412,274
Mortgages and Asset-Backed Securities		283,863,896
Hedge Funds		149,640,781
Short-Term Investments		167,590,589
Limited Partnerships		668,702,307
Total Investments		<u>2,162,264,152</u>
Invested Securities Lending Collateral		56,823,478
Net Investment in Capital Assets		
Land		84,000
Building		581,619
Furniture, Equipment and Software		3,514,780
Accumulated Depreciation		<u>(2,976,082)</u>
Net Investment in Capital Assets		1,204,317
<b>TOTAL ASSETS</b>		<b>\$2,238,989,787</b>

## **LIABILITIES:**

Accounts Payable		1,922,521
OPEB Obligation		715,962
Security Lending Collateral		58,389,459
Investment Purchases		<u>8,186,805</u>
<b>TOTAL LIABILITIES</b>		<b>\$ 69,214,747</b>

**NET POSITION RESTRICTED FOR PENSIONS** **\$2,169,775,040**

See accompanying Notes to the Financial Statements.

# Statement of Changes in Fiduciary Net Position

For the Year Ended June 30, 2017

## **ADDITIONS:**

Contributions-Employer	\$ 206,562,924
Contributions-Employee	3,238,502
Contributions-Service Transfers from Other System	1,744,107
Contributions-Other	1,653,430
Total Contributions	<u>213,198,963</u>
Investment Income from Investing Activities	
Net Appreciation in Fair Value of Investments	187,425,144
Interest and Dividends	63,059,296
Less: Investment Expenses	30,460,874
Net Investment Income	<u>220,023,566</u>
Income from Securities Lending Activities	
Securities Lending Gross Income	551,362
Less: Securities Lending Expenses, net	273,801
Net Income from Securities Lending Activities	<u>277,561</u>
Other Income	<u>614</u>
<b>NET ADDITIONS</b>	<b><u>\$ 433,500,704</u></b>

## **DEDUCTIONS:**

Monthly Benefits	
Retiree and Survivor Annuity Benefits	227,997,513
BackDROP Payments	16,887,349
Disability Benefits	2,498,178
Death Benefits	855,153
Service Transfer Payments	2,724,631
Employee Contribution Refunds	321,328
Administrative Expenses	<u>4,515,458</u>
<b>TOTAL DEDUCTIONS</b>	<b><u>\$ 255,799,610</u></b>
NET INCREASE	177,701,094
<b>NET POSITION RESTRICTED FOR PENSIONS</b>	
Beginning of Year	<u>1,992,073,946</u>
End of Year	<u><u>\$2,169,775,040</u></u>

See accompanying Notes to the Financial Statements.

# Notes to the Financial Statements

For the Year Ended June 30, 2017

## NOTE 1 - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

As established under Section 104.020 of the Revised Statutes of Missouri (RSMo.), the Missouri Department of Transportation and Highway Patrol Employees' Retirement System (MPERS) is a body corporate and an instrumentality of the State of Missouri (State). Due to the nature of MPERS' reliance on funding from the Missouri Department of Transportation (MoDOT) and the Missouri State Highway Patrol (MSHP) and control of the overall plan document by the legislative and executive branches of state government, MPERS is considered a part of the State of Missouri financial reporting entity and is included in the State's financial reports as a component unit shown as a pension trust fund.

### **Note 1 (a) - Basis of Accounting**

The financial statements were prepared using the accrual basis of accounting. Contributions are due to MPERS when employee services have been performed and paid. Contributions are recognized as revenues when due, pursuant to statutory requirements. Benefits are recognized when due and payable and expenses are recorded when the corresponding obligations are incurred. Dividend income is recognized when dividends are declared. Interest income is recognized when earned.

### **Note 1 (b) - Method Used to Value Investments**

Investments are reported at fair value on a trade date basis. Bonds and stocks traded on a national or international exchange are valued at the reported sales price at current exchange rates. Mortgages are valued on the basis of future principal and interest payments

and are discounted at prevailing interest rates for similar instruments. The fair value of real estate and timber investments are based on net asset value estimates provided by the general partners' administrators or portfolio managers, which are compared to independent appraisals. Investments that do not have an established market are reported at estimated fair value. The fair value of the hedge fund portfolios and partnership portfolios are based on valuations of the underlying assets as reported by the general partner or portfolio manager.

### **Note 1 (c) - Net Investment in Capital Assets**

MPERS capitalizes assets with an expected useful life greater than one year and a cost greater than \$1,000. Capital assets are depreciated on the straight-line method over the estimated useful lives of the related assets. The estimated useful lives are as follows:

Furniture, Equipment and Software	3 – 10 years
Building and Improvements	30 years

### **Note 1 (d) - Use of Estimates**

The preparation of financial statements in conformity with U.S. generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements, and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

## NOTE 2 – PLAN DESCRIPTIONS AND CONTRIBUTION INFORMATION

MPERS is a body corporate and an instrumentality of the state as a multiple-employer, public employee retirement system with one plan that has three benefit structures known as the Closed Plan, the Year 2000 Plan, and the Year 2000 Plan-2011 Tier. The plan provides retirement, survivor, and disability benefits for employees of MoDOT, MSHP, and MPERS. The plan is administered in accordance with the requirements of a cost sharing, multiple-employer, public employee retirement plan under the Revised Statutes of Missouri. In MPERS are vested the powers and duties specified in sections 104.010 to 104.312, 104.601 to 104.805, and 104.1003 to 104.1093, 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 outlined pursuant to these sections. Responsibility for the operation and administration

of the System is vested in the Board of Trustees, which consists of eleven members, four elected by the active and retired plan members, three Highway and Transportation Commissioners, a State Senator appointed by the President Pro-Tem of the Senate, a State Representative appointed by the Speaker of the House, and the Director of the MoDOT and Superintendent of the MSHP who serve as ex-officio members. Detailed information regarding contributions can be found in Note 5.

Generally, all covered employees hired before July 1, 2000, are eligible for membership in the Closed Plan. All covered employees hired on or after July 1, 2000, and before January 1, 2011, are eligible for membership in the Year 2000 Plan. All covered employees hired on or after January 1, 2011 are eligible for membership in the Year 2000 Plan's 2011 Tier.

# Notes to the Financial Statements

For the Year Ended June 30, 2017

## ***Membership in the Closed Plan, Year 2000 Plan, and 2011 Tier as of June 30, 2017***

	Closed	Year 2000	2011 Tier	Total
Retirees, Beneficiaries, and Disabilities				
Currently Receiving Benefits	5,016	3,855	5	8,876
Terminated Employees Entitled to But Not Yet Receiving Benefits	1,440	879	0	2,319
Active Employees				
Vested	2,615	2,473	0	5,088
Non-Vested	2	82	2,279	2,363
<b>Total Membership</b>	<b>9,073</b>	<b>7,289</b>	<b>2,284</b>	<b>18,646</b>

### **Closed Plan Description**

Employees covered by the Closed Plan are fully vested for benefits upon receiving 5 years of creditable service. Under the Closed Plan, MoDOT and civilian employees may retire with full benefits upon the earliest of attaining:

- Age 65 with 4 or more years of creditable service (active);
- Age 65 with 5 or more years of creditable service (terminated & vested);
- Age 60 with 15 or more years of creditable service (active or terminated & vested); or
- "Rule of 80" – at least age 48 with sum of member's age and service equaling 80 or more (active or terminated & vested).

The following provisions apply for uniformed patrol members of the Closed Plan:

- Age 55 with 4 or more years of creditable service (active);
- Age 55 with 5 or more years of creditable service (terminated & vested);
- "Rule of 80" – at least age 48 with sum of member's age and service equaling 80 or more (active or terminated & vested); or
- Mandatory retirement at age 60 (active).

All non-uniformed members may retire early, with reduced benefits, at age 55 with at least 10 years of creditable service.

The base benefit in the Closed Plan is equal to 1.6% multiplied by the final average pay multiplied by years of creditable service. For members of the uniformed patrol, the base benefit is calculated by applying the same formula, then multiplying the product by 1.333333.

Retired uniformed members will receive an additional

benefit of \$90 per month, plus cost-of-living adjustments (COLAs), until attainment of age 65. This payment, however, is reduced by any amount earned during gainful employment. This benefit is not available to uniformed members hired after January 1, 1995, or to vested deferred members.

For members employed prior to August 28, 1997, COLAs are provided annually based on 80% of the increase in the consumer price index for all urban consumers for the United States (CPI-U). The minimum rate is 4% and the maximum rate is 5%, until the cumulative amount of COLAs equals 65% of the original benefit. Thereafter, the 4% minimum rate is eliminated and the annual COLA rate will be equal to 80% of the increase in the CPI-U (annual maximum of 5%). For members employed on or after August 28, 1997, COLAs are provided annually based on 80% of the increase in the CPI-U, up to a maximum rate of 5%.

The BackDROP is a payment option that is available to eligible members upon retirement. This option provides for a benefit to be calculated as if the member elected to retire at a previous date. If the BackDROP is elected, the monthly benefit payable on the actual retirement date is based on the benefit that would have been received by the member had he/she left employment and retired on the BackDROP date. In addition, the member will receive a lump sum payment equal to 90% of the life income annuity amount the member would have received during the BackDROP period. This lump sum amount includes any COLAs and other benefit increases; also, credit will be received for the unused sick leave balance as of the date of retirement.

The life income annuity payment option (which contains no provision for survivorship) and the life income with 60

# Notes to the Financial Statements

For the Year Ended June 30, 2017

or 120 month guaranteed payment options are available to all members. Joint and 50% or 100% survivor options are available if married at the time of retirement. In the Closed Plan, the reduction for the joint & 100% survivor option is based on the difference between the age of the member and the survivor. There is no reduction for the joint and 50% survivor option.

If a reduced joint and survivor option is chosen at the time of retirement and the spouse precedes the member in death, the benefit will revert back (pop-up) to a normal annuity, upon appropriate notification to MPERS.

Members may name a new spouse as beneficiary if:

- They were single at retirement and since married;
- They elected a spouse option at the time of retirement, the spouse preceded the member in death, and then a remarriage occurred.

The member has 1 year from the date of marriage to re-elect a payment option and name a new spouse.

All members who retire from active employment or long-term disability, or begin receiving normal or work-related disability benefits, on or after September 28, 1985, are provided a \$5,000 death benefit payable to designated beneficiaries.

## **Year 2000 Plan Description**

Employees covered by the Year 2000 Plan are fully vested for benefits upon earning 5 years of creditable service. Under the Year 2000 Plan, MoDOT and civilian employees may retire with full benefits upon the earliest of attaining:

- Age 62 and with 5 or more years of creditable service (active or terminated & vested);
- "Rule of 80" – at least age 48 with sum of member's age and service equaling 80 or more (active).

The following provisions apply for uniformed patrol members of the Year 2000 Plan:

- "Rule of 80" – at least age 48 with sum of member's age and service equaling 80 or more (active);
- Mandatory retirement at age 60 (active only).

All members may retire early with reduced benefits at age 57 with at least 5 years of creditable service.

The base benefit in the Year 2000 Plan is equal to 1.7% multiplied by the final average pay multiplied by years of creditable service. Members retiring under the Rule of 80, and uniform patrol members retiring at the mandatory retirement age (currently 60), receive an additional temporary benefit until age 62. The

temporary benefit is equivalent to 0.8% multiplied by final average pay multiplied by years of creditable service.

COLAs are provided annually based on 80% of the increase in the CPI-U, up to a maximum rate of 5%.

The BackDROP is a payment option that may be available to members upon retirement. This option provides for a monthly benefit to be calculated as if the member elected to retire at a previous date. If the BackDROP is elected, the monthly benefit payable on the actual retirement date is based on the benefit that would have been received by the member had he/she left employment and retired on the BackDROP date. In addition, the member will receive a lump sum payment equal to 90% of the life income annuity amount the member would have received during the BackDROP period. This lump sum amount includes any temporary benefits, COLAs and other benefit increases; also, credit will be received for the unused sick leave balance as of the date of retirement.

The life income annuity payment option (with no provision for survivorship) and the life income with 120 or 180 months guaranteed payment options are available to all members. Joint and 50% or 100% survivorship options are available if married at the time of retirement. The reduction for the joint and 50% or 100% survivor options is based on the member's age at retirement, as well as the age difference between the member and the survivor.

If a reduced joint and survivor option is chosen at the time of retirement and the spouse precedes the member in death, the benefit will revert back (pop-up) to a normal annuity, upon appropriate notification to MPERS.

Members may name a new spouse for survivor benefits if:

- They were single at retirement and since married;
- They elected a spouse option at the time of retirement, the spouse preceded the member in death, and then a remarriage occurred.

The member has 1 year from the date of marriage to re-elect the payment option and name a new spouse.

All members who retire from active employment or long-term disability, or begin receiving work-related disability benefits, on or after July 1, 2000, are provided a \$5,000 death benefit payable to designated beneficiaries.



# Notes to the Financial Statements

For the Year Ended June 30, 2017

## **Year 2000 Plan-2011 Tier Description**

Employees covered by the 2011 Tier are fully vested for benefits upon earning 10 years of creditable service. Under the 2011 Tier, MoDOT and civilian employees may retire with full benefits upon the earliest of attaining:

- Age 67 and with 10 or more years of creditable service (active or terminated & vested);
- "Rule of 90" – at least age 55 with sum of member's age and service equaling 90 or more (active only).

Active MoDOT and civilian employees may retire early with reduced benefits at age 62 with at least 10 years of creditable service.

The following provisions apply for uniformed patrol members of the 2011 Tier:

- Age 55 and with 10 or more years of creditable service (active only);
- Mandatory retirement at age 60 with no minimum service amount (active only).

Terminated and vested uniformed patrol employees may retire at age 67 with 10 or more years of creditable service.

The base benefit in the 2011 Tier is equal to 1.7% multiplied by the final average pay multiplied by years of creditable service. Members retiring under the Rule of 90, and uniform patrol members retiring at the mandatory retirement age (currently 60) or at age 55 with 10 years of creditable service, receive an additional temporary benefit until age 62. The temporary benefit is equivalent to 0.8% multiplied by final average pay multiplied by years of creditable service.

COLAs are provided annually based on 80% of the change in the CPI-U, up to a maximum rate of 5%.

The life income annuity payment option (with no provision for survivorship) and the life income with 120 or 180 months guaranteed payment options are available to all members. Joint and 50% or 100% survivorship options are available if married at the time of retirement. The reduction for the joint and 50% or 100% survivor options is based on the member's age at retirement, as well as the age difference between the member and the survivor.

If a reduced joint and survivor option is chosen at the time of retirement and the spouse precedes the member in death, the benefit will revert back (pop-up) to a normal annuity, upon appropriate notification to MPERS.

Members may name a new spouse for survivor benefits if:

- They were single at retirement and since married;
- They elected a spouse option at the time of retirement, the spouse preceded the member in death, and then a remarriage occurred.

The member has 1 year from the date of marriage to re-elect the payment option and name a new spouse.

All members who retire from active employment or long-term disability, or begin receiving work-related disability benefits, on or after January 1, 2011, are provided a \$5,000 death benefit payable to designated beneficiaries.

## **Contributions**

Beginning January 1, 2011, employee contributions of 4% of gross pay are required for those covered by the Year 2000 Plan-2011 Tier.

Employer contributions are determined through annual actuarial valuations. Administrative expenses are financed through contributions from participating employers and investment earnings.

Participating employers are required to make contributions to the plan based on the actuarially determined rate. Prior to August 13, 1976, contributions by all plan members were required. Accumulated employee contributions made prior to that time, plus interest, were refunded to applicable members. Maximum contribution rates were eliminated August 13, 1976. Detailed information regarding contributions can be found in Note 5.

# Notes to the Financial Statements

For the Year Ended June 30, 2017

## NOTE 3 – DEPOSITS AND INVESTMENTS

The Board of Trustees has established policies and procedures by which funds are invested. Section 104.150, RSMo., provides the authority for the Board to invest MPERS funds. Plan assets are invested in a diversified portfolio following prudent standards for preservation of capital, with the goal of achieving the highest possible rate of return consistent with MPERS' tolerance for risk. The Board of Trustees establishes MPERS' asset allocation policy, and may amend the policy. The following is MPERS' current asset allocation policy:

<b>Asset Class</b>	<b>Target Allocation</b>
Global Equity	30.0%
Private Equity	15.0%
Fixed Income	20.0%
Real Assets	7.5%
Real Estate	10.0%
Hedge Funds	10.0%
Opportunistic Debt	7.5%
Cash	0%

### **Note 3 (a) - Deposit and Investment Risk Policies**

#### **Concentration of Credit Risk**

Concentration of credit risk is the risk of loss attributed to the magnitude of the System's investment in a single issuer. Within the traditional asset classes (equities and fixed income), the consultant will aggregate exposures across asset classes to create measures of concentration including industries, countries and security issuer for Investment staff review.

#### **Investment Custodial Credit Risk**

Custodial credit risk is an investment risk that, in the event of the failure of the counterparty to a transaction, the System will not be able to recover the value of its investment or the collateral securities that are in the possession of an outside party. Investment securities are exposed to custodial credit risk if the securities are uninsured, are not registered in the name of the System, and are held by either: a) the counterparty or b) the counterparty's trust department or agent but not in the System's name. It is the policy of the System to require that all investments be clearly marked as to ownership and, to the extent possible, shall be registered in the name of the System.

#### **Cash Deposit Custodial Credit Risk**

Cash deposit custodial credit risk is the risk that, in the event of the failure of depository financial institution, the System will not be able to recover deposits or will not be able to recover collateral securities that are in the possession of an outside party. Missouri state law requires that all public funds must be collateralized with acceptable securities having market values of at least 100% of the amount of funds on deposit (less any amount covered by FDIC insurance).

#### **Market Risk**

Market risk is the risk that the fair value of an investment will be adversely impacted due to a change in value of the underlying market. The three primary market risks prevalent in the System's investment portfolio are equity prices, interest rates, and foreign currencies. Equity risk is the risk that stock prices fall and/or the volatility in the equity market increases. Interest rate risk is the risk that fixed income securities (or any investment primarily valued on a yield basis) will drop in value due to an increase in interest rates. Currency risk is the risk that changes to foreign exchange rates will adversely impact the fair value of non-U.S. Dollar denominated assets. The System protects the portfolio against market risks by adopting a diversified asset allocation that limits the amount of exposure to each underlying market risk. Market risks are also controlled by monitoring the types, amounts, and degree of risk that each investment manager takes for their specific mandate.

#### **Investment Credit Risk**

Investment credit risk is the risk that an issuer or other counterparty to an investment will not fulfill its obligations. Unless authorized under a separate Investment Management Agreement or operating agreement, it is the policy of the System to limit fixed income managers to purchasing securities that possess a minimum credit rating of "Baa" by Moody's and "BBB" by Standard & Poor's. Issues subsequently downgraded below these ratings must be brought to the attention of the Chief Investment Officer. Where counterparty risk is present, the System's investment managers seek to control credit risk through counterparty credit evaluations and approvals, counterparty credit limits and exposure monitoring procedures.

### **Note 3 (b) - Cash Deposits**

Cash balances include short-term securities held by the custodial bank to meet future obligations and operating balances held by the depository bank. As of June 30, 2017, MPERS had a carrying amount of deposits of (\$230,192), and a bank balance of \$457. The FDIC covered the bank balances. To maximize investment income, cash is invested in overnight repurchase agreements, thus causing the negative cash amount disclosed above. The balances in these repurchase agreements at June 30, 2017 totaled \$401,967. As of June 30, 2017, no investments were held as repurchase agreements that were uninsured or unregistered, with securities held by the counterparty or by its trust department or agent but not in MPERS' name.

# Notes to the Financial Statements

For the Year Ended June 30, 2017

## **Note 3 (c) – Concentrations**

No investments in any one organization (other than those issued or sponsored by the U.S. government and those in pooled investments) represent 5% of plan net position.

## **Note 3 (d) – Rate of Return**

For the year ended June 30, 2017, the annual money-weighted rate of return on pension plan investments, net of pension plan investment expense, was 11.22%. The money-

weighted rate of return expresses investment performance, net of investment expense, adjusted for the changing amounts actually invested.

## **Note 3 (e) – Investments**

The following table shows MPERS' investments by type.

### **Summary of Investments by Type at June 30, 2017**

	Carrying Amount	Fair Value
Government Obligations	\$ 269,449,652	\$ 278,549,207
Corporate Bonds	13,484,577	13,954,059
Stock and Rights/Warrants	234,434,350	358,551,039
Real Estate	220,658,853	241,412,274
Mortgages & Asset-Backed Securities	297,306,866	283,863,896
Hedge Funds	114,702,809	149,640,781
Limited Partnerships	636,962,049	668,702,307
Short-Term Investments	167,977,753	167,590,589
Total Investments	<u>\$1,954,976,909</u>	<u>\$2,162,264,152</u>

Certain investments are not listed on national exchanges, over-the-counter markets, nor do they have quoted market prices. Their valuation is based on the most current net asset values, independent appraisals, and/or good faith estimates of the investment's fair value provided by the general partner or portfolio manager, cash flow adjusted through fiscal year end. The estimated fair value of these investments may differ significantly from values that would have been used had a ready market existed. The following investments were priced using those methods and comprised 49% of the total fair value of the System's investments as of June 30, 2017:

Real Estate	\$ 241,412,274
Hedge Funds	149,640,781
Limited Partnerships	668,702,307
	<u>\$1,059,755,362</u>

## **Note 3 (f) – Fair Value Measurements**

MPERS 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:** Values 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.

# Notes to the Financial Statements

For the Year Ended June 30, 2017

## Investments Measured at Fair Value, June 30, 2017

Investments by Fair Value Level	Fair Value	Level 1	Level 2	Level 3
Short Term Securities	\$ 163,527,478	\$ 163,527,478	\$ 0	\$ 0
Debt Securities				
Collateralized Debt Obligations	189,429,902	0	75,881,332	113,548,570
Commercial Mortgage-Backed Securities	55,188,073	0	11,036,956	44,151,117
Corporate Bonds	3,215,221	0	3,215,221	0
Government Commercial				
Mortgage-Backed Securities	4,935,354	0	1,068,042	3,867,312
Government Mortgage-Backed Securities	35,787,050	0	22,263,894	13,523,157
Municipal Bonds	151,807,106	0	61,494,665	90,312,441
U.S. Government Agencies	77,752,255	0	77,752,255	0
U.S. Treasury Securities	55,859,205	0	55,859,205	0
Total Debt Securities	573,974,167	0	308,571,570	265,402,596
Equity Securities				
Consumer Discretionary	11,706,862	11,706,862	0	0
Consumer Staples	1,624,891	1,624,891	0	0
Energy	68,580,415	68,580,415	0	0
Equity Other	23,131,393	23,131,393	0	0
Financials	19,730,652	19,708,701	21,951	0
Health Care	6,228,069	6,228,069	0	0
Industrials	8,053,303	8,053,303	0	0
Information Technology	11,729,313	11,729,313	0	0
Materials	1,008,628	1,008,628	0	0
Real Estate	7,953,103	7,953,103	0	0
Telecommunication Services	2,363,848	2,363,848	0	0
Utilities	157,612	157,612	0	0
Total Equity Securities	162,268,088	162,246,137	21,951	0
Private Markets				
Private Equity	348,961,860	0	0	348,961,860
Real Estate	72,515,055	0	0	72,515,055
Real Assets	221,757,657	0	0	221,757,657
Opportunistic Debt	156,102,850	0	0	156,102,850
Total Private Markets	799,337,422	0	0	799,337,422
Investment Derivative Instruments				
Equity Futures	150,510	150,510	0	0
Equity Swaps	(218,263)	0	(218,263)	0
FX Forwards (liabilities)	(454,601)	0	(454,601)	0
Total Investment Derivative Instruments	(522,354)	150,510	(672,864)	0
<b>Total Investments by Fair Value Level</b>	<b>1,698,584,801</b>	<b>\$325,924,125</b>	<b>\$307,920,657</b>	<b>\$1,064,740,019</b>
Investments Measured at Net Asset Value				
Equity Long/Short	25,269,335			
Multi-Strategy	21,036,603			
In Liquidation	831,850			
Commodity Trading Advisors	19,288,635			
Activist Equity	27,305,446			
Event	11,518,711			
Fundamental Equity Market Neutral	15,219,650			
Global Asset Allocation	17,770,549			
Structured Credit -Relative Value	11,400,001			
Commingled International Equity Funds	315,501,388			
Total Investments	465,142,169			
Measured at Net Asset Value	465,142,169			
<b>Total Investments</b>	<b>\$2,163,726,971</b>			
<b>Reconciliation to Statement of Fiduciary Net Position</b>				
Total Investments Measured at				
Fair Value and Derivatives	\$ 2,163,726,971			
Investment Sales Receivable	(4,073,357)			
Investment Purchases Payable	8,186,805			
Accrued Interest and Income	(5,686,056)			
Accrued Expenses	109,789			
<b>Total Investments per Statement of</b>				
<b>Fiduciary Net Position</b>	<b>\$2,162,264,152</b>			

# Notes to the Financial Statements

For the Year Ended June 30, 2017

Investments listed as level 1 include equity securities and futures contracts where the price comes from an exchange.

Investments listed as level 2 include debt securities where an independent pricing evaluator had direct observable information including: trading volume, multiple sources of market data and benchmark spreads. FX forwards are included due to the valuation coming from observable forward rates on the underlying currencies. The equity index swap is included because the valuation inputs include an observable interest rate and the underlying index.

Investments listed as level 3 include debt securities where an independent pricing evaluator did not have direct observable information and had limited market information for comparable securities. Significant inputs used in the valuation are not available aside from the evaluator providing the price. Direct investments in private equity, real estate, credit, and real assets are included because the valuation techniques utilize discounted cash flows or other non-observable market information by manager.

## ***Investments Measured at Net Asset Value, June 30, 2017***

<b>Investments by Fair Value Level</b>	<b>Fair Value</b>	<b>Unfunded Commitments</b>	<b>Redemption Frequency (If Currently Eligible)</b>	<b>Redemption Notice Period</b>
<b>Hedge Fund</b>				
Equity Long/Short	\$ 25,269,335	\$ 0	Quarterly	45-60 Days
Multi-Strategy	21,036,603	0	Quarterly	60-90 Days
In Liquidation	831,850	0	n/a	n/a
Commodity Trading Advisors	19,288,635	0	Monthly	30 Days
Activist Equity	27,305,446	0	Yearly, Every 3 Years	90 Days
Event	11,518,711	0	Monthly	90 Days
Fundamental Equity Market Neutral	15,219,650	0	Monthly	90 Days
Global Asset Allocation	17,770,548	0	Monthly	5 Days
Structured Credit - Relative Value	11,400,001	0	Quarterly	60 Days
<b>Total Hedge Fund</b>	<b>149,640,781</b>	<b>0</b>		
Commingled International Equity Funds	196,603,293	0	Daily, Monthly	0-30 Days
Commingled International Equity Funds	118,898,095	0	Daily	90 Days
<b>Total Commingled International Equity Funds</b>	<b>315,501,388</b>	<b>0</b>		
<b>Total Investments at Net Asset Value</b>	<b>\$465,142,169</b>	<b>\$ 0</b>		
<b>Private Markets</b>				
Private Equity	\$ 348,961,860	\$117,074,892		
Real Estate	72,515,055	68,646,328		
Real Assets	221,757,657	61,038,200		
Opportunistic Debt	156,102,850	113,439,234		
<b>Total Private Markets</b>	<b>\$ 799,337,422</b>	<b>\$360,198,654</b>		

# Notes to the Financial Statements

For the Year Ended June 30, 2017

## **Hedge Funds**

**Equity Long/Short:** Consisting of three funds, this strategy invests in both long and short in U.S. and global equity securities, with a goal of adding growth and minimizing market exposure. Due to contractual lock-up restrictions, the value of these investments is eligible for redemption in the next six to nine months.

**Multi-Strategy:** The three funds that make up this group aim to pursue varying strategies in order to diversify risks and reduce volatility. Due to contractual lock-up restrictions, the value of these investments is eligible for redemption in the next six to nine months.

**Hedge Funds in Liquidation:** MPERS currently has a small investment in three hedge funds that are in liquidation. These funds have closed and MPERS is awaiting the sale of final assets.

**Commodity Trading Advisors:** MPERS currently has one fund focusing on a systematic strategy that follows medium-term trends. The value of this investment is eligible for redemption in the next two months.

**Activist:** Consisting of two funds, this strategy focuses on obtaining publicly traded shares of companies and effecting changes within the companies that it owns whether that be value creation through operational, financial or corporate governance changes. One fund's focus is on North American companies and the other fund's focus is on European and Nordic companies. Due to contractual lock-up restrictions and the necessity for activist managers to retain capital in order to realize the desired company changes, 50% of this strategy's investments are eligible for redemption on a rolling three-year basis. The remaining 50% are eligible for redemption on a rolling one-year basis.

**Event Driven:** Consisting of one fund, this strategy seeks to gain an advantage from pricing inefficiencies that may occur at the onset or aftermath of a merger, corporate action or related event. Due to contractual lock-up restrictions, the value of these investments is eligible for redemption in the next four months.

**Fundamental Equity Market Neutral:** Consisting of one fund, this strategy invests in both long/short equities capturing price differences and seeks to maintain a neutral exposure to the market by having no sector, industry, market capitalization, or country biases. Due to contractual lock-up restrictions, the value of these investments is eligible for redemption in the next four months.

**Global Asset Allocation:** Consisting of one fund, this strategy is highly diversified and uses fundamental research to developing systematic rules for trading positions. Due to contractual lock-up restrictions, the value of these investments is eligible for redemption in the next four months.

**Relative Value Hedge Funds:** Consisting of one fund, this strategy's main focus is to benefit from valuation discrepancies that may be present in related financial instruments by simultaneously purchasing or selling these instruments. Due to contractual lock-up restrictions, all funds are eligible for redemption within the next six months.

## **Commingled International Equity Funds**

MPERS invests in three international equity funds that are considered to be commingled in nature. Due to contractual lock-up restrictions, 70% of this capital is eligible for redemption in one month; the remaining 30% has daily liquidity.

## **Private Markets**

Private equity, real estate, real assets and opportunistic debt are the four asset classes that fall into the category of private market funds. These funds invest in the equity or debt of private companies.

**Private Equity:** The private equity portfolio includes 17 direct fund investments and two fund of fund investments. These funds invest in private companies adding value through operational or industry expertise and vast networks. The majority of the private equity allocation is in buyout funds with a smaller portion in venture capital funds. 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 six to ten years.

**Real Estate:** The real estate portfolio consists of 20 real estate funds. The noncore real estate book includes 17 real estate funds and invests in value-add or opportunistic strategies. 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 six to ten years. The remaining three investments are in core real estate funds. These funds are open-ended and are eligible for redemption on a daily basis.

# Notes to the Financial Statements

For the Year Ended June 30, 2017

**Real Assets:** The real asset portfolio contains 18 funds that invest in private energy, mining and shipping companies. The timber portfolio, which includes both ownership in timber funds and direct timber investments, is also within the real assets portfolio. The timber portfolio has 4 director timber investments and 1 investment under review with earnest money paid. These funds and investments are not eligible for redemption. Distributions are received as underlying investments and investments within the funds are liquidated, which on average can occur over the span of six to ten years.

**Opportunistic Debt:** The opportunistic debt portfolio, comprised of 25 funds, provide financing to private

companies. While this portfolio has a U.S. bias, some funds invest internationally with exposures in Europe and Asia. 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 three to five years.

## **Note 3 (g) – Investment Interest Rate Risk**

The following table summarizes the maturities of government obligations, corporate bonds, convertible corporate bonds, mortgages, and asset-backed securities which are exposed to interest rate risk.

### **Summary of Weighted Average Maturities at June 30, 2017**

Investment Type	Fair Value	Investment Maturities (in years)			
		less than 1	1 - 5	6 - 10	more than 10
Asset-Backed Securities	\$192,390,185	\$0	\$404,674	\$101,341,702	\$90,643,809
Commercial Mortgage-Backed Securities	37,572,989	0	910,541	0	36,662,448
Corporate Bonds	7,479,140	0	0	0	7,479,140
Government Agencies	54,571,955	0	3,322,729	12,454,885	38,794,341
Government Bonds	48,267,931	0	0	0	48,267,931
Government Mortgage-Backed Securities	2,118,458	0	888,474	1,229,984	0
Government-issued Commercial Mortgage-Backed	34,230,228	0	0	0	34,230,228
Index Linked Govt Bonds	34,353,968	0	16,251,163	0	18,102,805
Municipal/Provincial Bonds	141,355,353	2,500,605	1,639,955	29,432,813	107,781,980
Non-Govt Backed C.M.O.s	17,552,036	0	0	0	17,552,036
Short Term Bills and Notes	12,557,511	12,557,511	0	0	0
<b>Grand Total</b>	<b>\$582,449,754</b>	<b>\$15,058,116</b>	<b>\$23,417,536</b>	<b>\$144,459,384</b>	<b>\$399,514,718</b>

# Notes to the Financial Statements

For the Year Ended June 30, 2017

## **Note 3 (h) – Investment Credit Ratings**

The following table summarizes the credit ratings

of the government obligations, corporate bonds, mortgages, and asset-backed securities.

### **Summary of Credit Ratings at June 30, 2017**

<b>Investment Type</b>	<b>Quality Rating</b>	<b>Fair Value</b>
Asset-Backed Securities	AAA	\$ 59,020,076
Asset-Backed Securities	AA	48,249,411
Asset-Backed Securities	A	4,503,854
Asset-Backed Securities	BB	4,447,587
Asset-Backed Securities	not rated	76,169,257
Commercial Mortgage-Backed Securities	AAA	9,661,980
Commercial Mortgage-Backed Securities	AA	300,635
Commercial Mortgage-Backed Securities	BBB	100,250
Commercial Mortgage-Backed Securities	BB	411,132
Commercial Mortgage-Backed Securities	B	5,009,034
Commercial Mortgage-Backed Securities	CCC	977,951
Commercial Mortgage-Backed Securities	not rated	20,436,132
Commercial Mortgage-Backed Securities	us gov guar	675,875
Corporate Bonds	AA	1,090,590
Corporate Bonds	BBB	197,957
Corporate Bonds	not rated	6,190,593
Government Agencies	AA	47,004,796
Government Agencies	us gov guar	7,567,159
Government Bonds	us gov guar	48,267,931
Government Mortgage-Backed Securities	not rated	1,563,712
Government Mortgage-Backed Securities	us gov guar	29,973,524
Govt issue Commercial Mortgage-Backed Securities	us gov guar	4,811,450
Index Linked Government Bonds	us gov guar	34,353,968
Municipal/Provincial Bonds	AAA	39,583,247
Municipal/Provincial Bonds	AA	89,887,838
Municipal/Provincial Bonds	A	4,981,837
Municipal/Provincial Bonds	not rated	6,902,431
Non-Government Backed C.M.O.s	AA	173,600
Non-Government Backed C.M.O.s	A	610,563
Non-Government Backed C.M.O.s	BBB	272,948
Non-Government Backed C.M.O.s	BB	125,308
Non-Government Backed C.M.O.s	B	448,028
Non-Government Backed C.M.O.s	CCC	1,035,824
Non-Government Backed C.M.O.s	CC	143,415
Non-Government Backed C.M.O.s	D	4,607,636
Non-Government Backed C.M.O.s	not rated	10,134,714
Short Term Bills and Notes	us gov guar	12,557,511
<b>Total</b>		<b><u>\$582,449,754</u></b>



# Notes to the Financial Statements

For the Year Ended June 30, 2017

## **Note 3 (i) – Investment Foreign Currency Risk**

Currency risk is the risk that changes to foreign exchange rates will adversely impact the fair value of non-U.S. Dollar denominated assets. The following table summarizes MPERS' exposure to foreign currencies for all assets that are held in custody at the System's custodial

bank. MPERS' has exposure to foreign currencies in other areas of the portfolio, such as commingled international funds, hedge funds and private partnerships, which are held in the custody of other banks acting as administrators for the funds.

### **Exposure to Foreign Currency Risk as of June 30, 2017**

<b>Foreign Currency</b>	<b>Equities</b>	<b>Real Estate / Partnerships</b>	<b>Cash</b>	<b>Total</b>
Australian Dollar	\$ 692,677	\$ 0	\$ 0	\$ 692,677
British Pound Sterling	737,093	11,577,703	1,216,586	13,531,382
Canadian Dollar	155,408	0	0	155,408
Euro	2,186,526	16,038,511	89,539	18,314,576
Hong Kong Dollar	1,370,117	0	0	1,370,117
Japanese Yen	1,631,184	0	0	1,631,184
Singapore Dollar	374,591	0	0	374,591
<b>Total Exposure Risk</b>	<b>\$7,147,596</b>	<b>\$27,616,214</b>	<b>\$1,306,125</b>	<b>\$36,069,935</b>

## **Note 3 (j) – Securities Lending**

In accordance with the Board of Trustees' investment policy, MPERS participates in a securities lending program. The Northern Trust Company administers the program. There are no restrictions on the amount of securities that may be lent.

Securities that may be loaned include U.S. government and agency securities, corporate equity, and fixed income securities. Collateral may include cash, U.S. government securities and irrevocable letters of credit. U.S. securities are loaned in exchange for collateral valued at 102% of the fair value of the securities, plus any accrued interest. Non-U.S. securities are loaned in exchange for collateral valued at 105% of the fair value of the securities, plus any accrued interest. On June 30, 2017, MPERS had no credit risk exposure to borrowers, since the amount of collateral exceeded the amount of the loans.

Non-cash collateral cannot be pledged or sold unless the borrower defaults. The average term of the System's loans was approximately 125 days as of June 30, 2017. Cash open collateral is invested in a short-term

investment pool, which had an interest sensitivity of 33 days as of June 30, 2017. Cash collateral may also be invested separately in "term loans", in which case the investments match the loan term. These loans can be terminated on demand by either lender or borrower. There were no known violations of legal or contractual provisions, or borrower or lending agent default losses. There were no dividends or coupon payments owing on the securities lent. Securities lending earnings are credited on approximately the fifteenth day of the following month.

Indemnification deals with a situation in which a client's securities would not be returned due to the insolvency of a borrower and Northern Trust would fail to live up to its contractual responsibilities relating to the lending of those securities. Northern Trust's responsibilities include performing appropriate borrower and collateral investment credit analyses and demanding adequate types and levels of collateral.

The collateral held (including both cash collateral recognized in the Statement of Fiduciary Net Position and non-cash collateral) is:

### **Collateral Held as of June 30, 2017**

#### **Investment Type**

Equities	\$ 31,876,826
Government & government sponsored securities	26,512,633
<b>Total</b>	<b>\$58,389,459</b>

# Notes to the Financial Statements

For the Year Ended June 30, 2017

## **Note 3 (k) – Derivatives**

A derivative financial instrument is an investment whose value depends on the values of one or more underlying assets, financial indexes, or commodity prices. These investments include futures contracts, options contracts, and forward foreign currency exchange. Derivative financial instruments involve credit risk and market risk, as described in Note 3 (a), in varying levels.

Through MPERS' external managers, MPERS holds investments in futures contracts, swap contracts, options contracts, and forward foreign currency exchange contracts. MPERS enters futures and swaps contracts to gain exposure to certain markets and enters into forward

foreign exchange contracts primarily to hedge foreign currency exposure.

The notional value related to these derivative instruments is generally not recorded on the financial statements; however, the change in fair value of these instruments is incorporated in performance. The notional/fair value of \$216,970,814 for the various contracts in MPERS' portfolio as of June 30, 2017, is recorded in investments on the Statement of Fiduciary Net Position. The change in fair value of \$16,944,180 for the year ended June 30, 2017, is recorded in investment income on the Statement of Changes in Fiduciary Net Position.

### **Investment Derivatives as of June 30, 2017**

<b>Type</b>	<b>Classification</b>	<b>Notional/ Fair Value</b>	<b>Unrealized Gain (Loss)</b>
Futures Contracts	Investments, at fair value	\$ 210,481,171	\$ 15,329,411
Swap Contracts	Investments, at fair value	26,936,247	2,922,515
Rights/Warrants	Investments, at fair value	11,828	(192)
Foreign Currency Forward Contracts	Investments, at fair value	(20,458,432)	(1,307,554)
<b>Total</b>		<b>\$216,970,814</b>	<b>\$16,944,180</b>

Through the use of derivatives, MPERS is exposed to risk that the counterparties involved in the contracts are unable to meet the terms of their obligation. MPERS' investment managers seek to control this risk through counterparty credit evaluations and approvals,

counterparty credit limits, and exposure monitoring procedures. MPERS anticipates the counterparties will be able to satisfy their obligations under the contracts. The associated counterparty's credit rating is an A-.

## NOTE 4 – RECEIVABLES

### **Receivables as of June 30, 2017**

<b>Type</b>	<b>Total</b>
Contributions-MoDOT	\$5,323,101
Contributions-MSHP Non-Uniformed	1,169,172
Contributions-MSHP Uniformed	2,026,588
Contributions-Retirement System	195,302
Commission Recapture	758
Securities Lending	51,731
Investment Interest & Income	5,686,056
Investment Sales	4,073,357
<b>Total</b>	<b>\$18,526,065</b>

# Notes to the Financial Statements

For the Year Ended June 30, 2017

## NOTE 5 – CONTRIBUTIONS

MoDOT, MSHP, and MPERS make contributions to the System, as do employees covered under the Year 2000 Plan-2011 Tier. MPERS permanent funding policy provides for actuarially determined employer contributions using the entry-age normal cost method on a closed group basis (consisting of normal cost and amortization of any unfunded accrued liabilities over a 30-year period, beginning July 1, 2006). (The objective is to reduce the period by one year each year.) A temporary accelerated policy has been adopted where the total contribution is based on entry-age normal cost plus a 15-year amortization period for unfunded retiree liabilities and a 30-year amortization period for other unfunded liabilities. Both amortization periods are closed periods starting July 1, 2010. This temporary accelerated policy was adopted by the MPERS' Board of Trustees on September 17, 2009, and will remain in effect until such time as the retiree liability becomes 100% funded or the permanent policy produces a higher contribution rate. Actuarially determined rates, expressed as percentages of annual covered payroll, provide for amounts sufficient to fund those benefits designated by state statute to be funded in advance. Actuarial assumptions used to compute contribution requirements are the same as those used to compute the pension benefit obligation. The employee contribution rate for members of the Year 2000 Plan-2011 Tier is set by statute.

Required employer contributions totaling \$206,562,924

for fiscal year 2017, represent funding of normal costs and amortization of the unfunded accrued liability. Actual contributions made were 100% of required contributions. Contribution rates as determined by the System's actuary for the year ended June 30, 2017, are shown in the following table. The Board established actual rates to be the same as the actuarially determined rates.

### Contribution Rates

<b>MoDOT, MPERS &amp; Civilian Patrol</b>	<b>Uniformed Patrol</b>	<b>2011 Tier Employee</b>
58.00%	58.00%	4.00%

At the September 26, 2014 Board meeting, the Board adopted the use of a contribution rate stabilization reserve that would result in an MPERS employer contribution rate similar to the fiscal year 2015 rates. The reserve is intended to keep the contribution relatively level over time and may be used if the investment market experiences a downturn in the future. The Board further adopted (in February 2015) that the employer contribution rate would not fall below 58% unless 1) the fund became fully funded or 2) the contribution stabilization reserve reached \$250 million. The balance of the reserve as of June 30, 2017, was \$219,560,390.

## NOTE 6 – DEFERRED RETIREMENT OPTION PROGRAM

MPERS currently provides a BackDROP option. This is an election made at the time of actual retirement. In effect, it provides members an option to elect to receive a portion of their benefits as cash. Since the election is

not made until the member actually retires, the option is not treated as a DROP provision in accordance with generally accepted accounting principles.

## NOTE 7 – NET PENSION LIABILITY OF EMPLOYERS

The components of the net pension liability of the employers at June 30, 2017, were as follows:

Total pension liability	\$3,802,443,730
Plan fiduciary net position	(2,169,775,040)
Employers' net pension liability	<u>\$1,632,668,690</u>

Plan fiduciary net position as a percentage of the total pension liability 57.06%

Covered Employee Payroll \$356,515,416

# Notes to the Financial Statements

For the Year Ended June 30, 2017

Employers' net pension liability as a percentage of covered employee payroll 457.95%

of June 30, 2017, (see NOTE 3) are summarized in the following table:

## Actuarial Assumptions

The total pension liability amounts were determined by actuarial valuations as of June 30, 2017, using the following actuarial assumptions, applied to all prior periods included in the measurement:

Inflation	3.0%
Salary Increases	3.5% to 11%
Investment Rate of Return	7.75%

The mortality tables, for post-retirement mortality, used in evaluating allowances to be paid to non-disabled pensioners were the R-P 2000 Combined Healthy Mortality Tables projected 16 years and set back 1 year for males and females. Pre-retirement mortality used was 70% for males and 50% for females of the post-retirement tables set back 1 year for males and set back 1 year for females. Disabled pension mortality was based on PBGC Disabled Mortality Tables. The healthy mortality tables include a margin for mortality improvement. The margin is in the 16-year projection. The disabled mortality tables do not include a margin for mortality improvement.

The long-term (30 year) expected rate of return on pension plan investments was determined using a building-block method in which best-estimate ranges 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 arithmetic real rates of return were adopted by the plan's trustees after considering input from the plan's investment consultants and actuary. These estimates for each major asset class included in MPERS' target asset allocation as

<b>Asset Class</b>	<b>Long-Term Expected Real Rate of Return</b>
Global Equity	4.80%
Private Equity	6.50%
Fixed Income	0.50%
Real Assets	4.75%
Real Estate	2.75%
Hedge Funds	2.75%

## Discount Rate

A single discount rate of 7.75% was used to measure the total pension liability. This single discount rate was based on the expected rate of return on pension plan investments of 7.75%. The projection of cash flows used to determine this single discount rate assumed that plan member contributions will be made at the current contribution rate and that employer contributions will be made at rates equal to the difference between actuarially determined contribution rates and the member rate. The employers pay the same contribution rate for each employee regardless of the plan the employee was hired under. Based on these assumptions, the pension plan's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability.

Regarding the sensitivity of the net pension liability to changes in the single discount rate, the following presents the plan's June 30, 2017 net pension liability, calculated using a single discount rate of 7.75%, as well as what the plan's net pension liability would be if it were calculated using a single discount rate that is 1-percentage-point lower or 1-percentage-point higher:

## Current Single Discount

	<b>1% Decrease 6.75%</b>	<b>Rate Assumption 7.75%</b>	<b>1% Increase 8.75%</b>
Net Pension Liability	\$2,075,474,870	\$1,632,668,690	\$1,262,285,947

# Notes to the Financial Statements

For the Year Ended June 30, 2017

## NOTE 8 – EMPLOYER PROPORTIONATE SHARE

MPERS, as the administrative agent for the pension system, is also an employer of the pension system. The administrative expenses of the pension system are included in the deductions to the pension system's fiduciary net position. While the employer contributions of the other participating employers are funded from outside revenue sources, the employer contributions of MPERS are funded from sources already recognized as revenues, such as earnings on plan investments or contributions paid by the other participating employers.

Attempting to allocate a portion of the net pension liability to MPERS as an employer would result in an allocation of the net pension liability to the other participating employers. Accordingly, MPERS excludes its contributions from the employer proportionate share calculation for the reporting of a net pension liability, by assigning itself a proportionate share of 0%. This exclusion, in essence, shifts the portion of the net pension liability that would accrue to MPERS to the other participating employers.

## NOTE 9 – PERSONAL SERVICES AND RETIREMENT PLAN

MPERS employed 16 full-time employees and 1 part-time employee on June 30, 2017. Seven former MPERS employees have retired. Full-time employees are members of the System (see Note 8). For these employees, MPERS accrued 58.00% of payroll during FY2017, amounting

to \$1,087,268. The amounts for FY2017 and the three preceding years are shown below. These amounts are recorded as both a contribution and administrative expense. Information regarding the retirement plans can be found in Notes 2 and 5.

### **Net Obligations**

Year Ended June 30	Annual Contribution Accrual	
	Percent	Dollars
2015	58.76	907,064
2016	58.05	996,378
2017	58.00	1,087,268

<sup>(1)</sup> The Annual Required Contribution rate is equal to the Actuarially Required Contribution rate.

<sup>(2)</sup> New assumptions and/or methods adopted.

## NOTE 10 – OTHER POST-EMPLOYMENT BENEFITS (OPEB)

In addition to the retirement benefits described previously, MPERS provides a portion of health care insurance through the MoDOT and MSHP Medical and Life Insurance Plan (Insurance Plan) in accordance with Missouri State statutes. The Insurance Plan is considered an agent multiple-employer defined benefit plan administered by MoDOT. Medical insurance benefits are established by the Insurance Plan's Board of Trustees and are approved by the Missouri Highways and Transportation Commission. Benefits include general inpatient and outpatient medical services; mental, nervous and substance abuse care; and prescriptions. Eligible members are employees who retired from the System with a minimum of 5 years of service and who participate in the Insurance Plan. MoDOT issues a publicly available financial report that includes financial statements and required supplementary information for the Insurance Plan. Requests for this report should be

addressed to MoDOT, Controller's Division, P.O. Box 270, Jefferson City, MO 65102.

Employer and member contributions are established by the Insurance Plan's Board of Trustees and are approved by the Missouri Highways and Transportation Commission. Premiums vary by coverage categories, which include retirees, certain disabled employees, spouses, certain dependents, and survivors of deceased employees and retirees. Member and employer required contribution rates average approximately 31.4% and 68.6%, respectively. The Insurance Plan is financed on a pay-as-you-go basis and is an internal service fund of MoDOT.

MoDOT's actuarial valuations for the Insurance Plan are performed biennially. The July 1, 2015 actuarial valuation was used for the FY2016 and FY2017 financial

# Notes to the Financial Statements

For the Year Ended June 30, 2017

statements. For this period the annual required contribution (ARC) is equal to the annual OPEB cost. MPERS contributed \$45,293 in FY2017 (49.38% of the ARC), including implicit rate subsidies. Although funding is not related to payroll amounts, an equivalent ARC rate

would be 4.79% of annual covered payroll of \$1,912,145 for FY2017. MPERS' share of the net OPEB obligation was \$715,962 at June 30, 2017. MPERS' share of the changes in the Insurance Plan's net OPEB obligation is shown as follows:

## ***OPEB Cost and Obligation for the Year Ended June 30, 2017***

<b>Type</b>	<b>Total</b>
Normal Cost	\$37,661
Amortization Payment	50,520
Interest	30,734
Adjustment to ARC	(37,829)
Annual OPEB Cost	81,086
Contributions	(45,293)
Increase in Net OPEB Obligation	35,793
Net OPEB Obligation - Beginning of Year	680,169
Net OPEB Obligation - End of Year	<u>\$715,962</u>
% of Annual OPEB Cost Contributed	55.9%

MPERS' annual OPEB cost, percentage of OPEB cost contributed, and net OPEB obligation for the FY2017 and each of the two preceding years is as follows:

Year Ended June 30	Annual OPEB Cost	Percentage of OPEB Cost Contributed	Net OPEB Obligation
2015	\$77,435	42.60	\$643,809
2016	81,653	55.50	680,169
2017	81,086	55.90	715,962

Because the Insurance Plan is an internal service fund of MoDOT, the Insurance Plan's assets have not been set aside. Because of this, there is no actuarial value of assets, so the entire actuarial accrued liability (AAL) is

unfunded. Based on an actuarial report dated July 1, 2015, MPERS' portion of the AAL is \$908,347, which is equal to MPERS' portion of the unfunded actuarial accrued liability (UAAL), as shown below.

## ***Actuarial Accrued Liability***

Actuarial Accrued Liability	\$908,347
Actuarial Value of Assets	0
Unfunded Actuarial Accrued Liability (UAAL)	<u>\$908,347</u>
Funded Ratio (Actuarial Value of Plan Assets/AAL)	0%
Covered Payroll	\$1,912,145
UAAL as a Percentage of Covered Payroll	48%

Actuarial valuations of an ongoing plan reflect long-term perspective and involve estimates of the value of reported amounts and assumptions about the probability of occurrence of events far into the future. Examples include

assumptions about future employment, mortality, and the healthcare cost trend. These calculations are subject to continual revision as actual results are compared to past expectations and new estimates are made about the

# Notes to the Financial Statements

For the Year Ended June 30, 2017

future. A schedule of funding progress is presented as required supplementary information following the notes to the financial statements. The schedule of funding progress represents multi-year trend information about whether the actuarial value of plan assets is increasing or decreasing relative to the AAL for benefits.

Projections of benefits for financial reporting purposes are based on the substantive plan (the plan as understood by the employers and plan members) and include the types

of benefits provided at the time of each valuation and the historical pattern of sharing of benefit costs between the employers and plan members to that point. The actuarial methods and assumptions used include techniques that are designed to reduce short-term volatility in actuarial accrued liabilities and the actuarial value of assets, consistent with the long-term perspective of the calculations. The actuarial methods and assumptions utilized in the valuation are shown on the following table.

## **Actuarial Methods and Assumptions**

Actuarial Cost Method	Projected Unit Credit
UAAL Amortization Method	Level Dollar Amount
UAAL Amortization Period	30 Years
UAAL Amortization Approach	Open
Investment Return (Discount) Rate	4.0%
Healthcare Cost Trend Rate	7%, Decreasing to 4.5% in 2025
Admin Expense Trend (Inflation) Rate	4.0%

## NOTE 11 – CAPITAL ASSETS

### **Summary of Changes in Capital Assets**

	<b>6/30/2016 Balance</b>	<b>Additions</b>	<b>Deletions/ Retirements</b>	<b>6/30/2017 Balance</b>
Land	\$84,000	\$0	\$0	\$84,000
Building	581,619	0	0	581,619
Furniture, Equipment and Software	3,517,189	4,832	(7,241)	3,514,780
Less: Accumulated Depreciation	(2,613,708)	(369,615)	7,241	(2,976,082)
<b>Total</b>	<b>\$1,569,100</b>	<b>(\$364,783)</b>	<b>\$0</b>	<b>\$1,204,317</b>

## NOTE 12 – RISK MANAGEMENT

MPERS is exposed to various risks of loss related to natural disasters, asset theft or damage, errors and omissions, torts, and employee injuries.

MPERS has purchased commercial insurance related to capital asset loss and damage. Ancillary coverage provided through the property policy includes coverage for accounts receivable, loss of money and securities, employee dishonesty, and forgery and alterations. MPERS carries a \$2 million umbrella liability policy. MPERS has coverage through Missouri Highway and Transportation Commission's Self-Insurance Fund related to workers' compensation. MPERS' has also purchased a directors

and officers policy with \$1 million aggregate coverage. This coverage is inclusive of legal defense costs and carries a \$35,000 deductible. The State's Legal Expense Fund covers all state employees and officers, and MPERS has purchased surety bonds for the executive director and staff. Settlements have not exceeded coverages for each of the past three fiscal years.

MPERS has a disaster recovery plan that provides for continued computer operations at a remote location should the retirement office be unavailable for normal operations.

# Notes to the Financial Statements

For the Year Ended June 30, 2017

## NOTE 13 – SUBSEQUENT EVENT

In July 2017, legislation was signed into law that allows the Board to offer former vested members a voluntary one-time lump sum distribution, payable in 2018, as an alternative to receiving a monthly installment payable at a future date. The buyout calculation will be 50% of the

present value of the future monthly annuity, based on salary and service on record as of October 2017. As it is unknown how many former vested members will elect the buyout, potential savings cannot be determined.



# Required Supplementary Information

## Schedule Of The Employers' Net Pension Liability As of June 30,

	2017	2016	2015	2014	2013
Total Pension Liability	\$3,802,443,730	\$3,761,733,004	\$3,715,845,651	\$3,650,241,741	\$3,583,975,559
Plan Fiduciary Net Position	2,169,775,040	1,992,073,946	2,009,367,134	1,957,456,213	1,685,732,710
<b>Employers' Net Pension Liability</b>	<b>\$1,632,668,690</b>	<b>\$1,769,659,058</b>	<b>\$1,706,478,517</b>	<b>\$1,692,785,528</b>	<b>\$1,898,242,849</b>
Plan Fiduciary Net Position as a % of Total Pension Liability	57.06%	52.96%	54.08%	53.63%	47.04%
Covered Employee Payroll	\$356,515,416	\$344,635,441	\$342,264,593	\$336,590,797	\$323,205,767
Employers' Net Pension Liability as a % of Employee Covered Payroll	457.95%	513.49%	498.58%	502.92%	587.32%

Note: These schedules are intended to present information for 10 years, but may be built prospectively. Additional years will be displayed as they become available.

## Schedule Of Changes In The Employers' Net Pension Liability Year ended June 30,

	2017	2016	2015	2014	2013
<b>Total Pension Liability</b>					
Service Cost	\$45,713,403	\$45,441,305	\$45,358,095	\$44,739,603	\$44,446,279
Interest on the Total Pension Liability	283,568,441	280,432,068	275,284,910	270,525,608	265,339,848
Difference Between Expected and Actual Experience	(37,286,966)	(39,810,009)	(13,324,219)	(17,614,321)	(13,690,794)
Assumption Change	0	0	0	0	204,396,180
Benefit Payments	(246,617,775)	(236,488,629)	(236,905,323)	(227,958,108)	(220,623,394)
Refunds	(321,328)	(198,106)	(107,395)	(18,686)	(29,300)
Disability Premiums	(1,620,418)	(1,567,825)	(1,554,676)	(1,531,578)	(1,512,685)
Transfers to Other Retirement Systems	(2,724,631)	(1,921,451)	(3,147,482)	(1,876,336)	(629,246)
<b>Net Change in Total Pension Liability</b>	<b>40,710,726</b>	<b>45,887,353</b>	<b>65,603,910</b>	<b>66,266,182</b>	<b>277,696,888</b>
<b>Total Pension Liability - Beginning</b>	<b>3,761,733,004</b>	<b>3,715,845,651</b>	<b>3,650,241,741</b>	<b>3,583,975,559</b>	<b>3,306,278,671</b>
Total Pension Liability - Ending (a)	\$3,802,443,730	\$3,761,733,004	\$3,715,845,651	\$3,650,241,741	\$3,583,975,559
<b>Plan Fiduciary Net Position</b>					
Contributions - Employer	\$206,562,924	\$199,609,396	\$200,638,571	\$183,353,841	\$170,836,117
Contributions - Employee	4,891,932	3,482,513	3,294,162	2,260,563	1,139,450
Pension Plan Net Investment Income	220,301,741	21,432,095	92,645,571	319,445,780	198,141,088
Benefit Payments	(246,617,775)	(236,488,629)	(236,905,323)	(227,958,108)	(220,619,035)
Refunds	(321,328)	(198,106)	(107,395)	(18,686)	(29,300)
Disability Premiums	(1,620,418)	(1,567,825)	(1,554,676)	(1,531,578)	(1,512,685)
Pension Plan Administrative Expense	(4,515,458)	(4,370,860)	(4,066,944)	(3,736,355)	(2,997,225)
Net Transfers	(980,524)	808,228	(2,033,045)	(91,954)	(629,246)
<b>Net Change in Plan Fiduciary Net Position</b>	<b>177,701,094</b>	<b>(17,293,188)</b>	<b>51,910,921</b>	<b>271,723,503</b>	<b>144,329,164</b>
<b>Plan Fiduciary Net Position - Beginning</b>	<b>1,992,073,946</b>	<b>2,009,367,134</b>	<b>1,957,456,213</b>	<b>1,685,732,710</b>	<b>1,541,403,546</b>
<b>Plan Fiduciary Net Position - Ending (b)</b>	<b>\$2,169,775,040</b>	<b>\$1,992,073,946</b>	<b>\$2,009,367,134</b>	<b>\$1,957,456,213</b>	<b>\$1,685,732,710</b>
<b>Employers' Net Pension Liability - Ending (a) - (b)</b>	<b>\$1,632,668,690</b>	<b>\$1,769,659,058</b>	<b>\$1,706,478,517</b>	<b>\$1,692,785,528</b>	<b>\$1,898,242,849</b>

Note: These schedules are intended to present information for 10 years, but may be built prospectively. Additional years will be displayed as they become available.

# Required Supplementary Information

## Schedule Of Employers Contributions

### Last 10 Fiscal Years

	Actuarially Determined Contributions	Actual Contributions	Contribution Deficiency (Excess)	Covered Employee Payroll	Contributions as a Percentage of Employee Covered Payroll
2008	\$123,323,265	\$123,323,265	\$0	\$375,527,604	32.84
2009	122,613,975	122,613,975	0	379,140,306	32.34
2010	124,052,534	124,052,534	0	376,258,823	32.97
2011	149,952,750	149,952,750	0	363,345,651	41.27
2012	164,884,467	164,884,467	0	344,514,139	47.86
2013	170,836,117	170,836,117	0	329,863,134	51.79
2014	183,353,841	183,353,841	0	336,799,855	54.44
2015	200,638,571	200,638,571	0	342,211,446	58.63
2016	199,609,396	199,609,396	0	344,154,131	58.00
2017	206,562,924	206,562,924	0	356,142,972	58.00

## Schedule Of Investment Returns

### Last 10 Fiscal Years

Fiscal Year Ended June 30	Annual Money-Weighted Rate of Return
2008	-2.29%
2009	-24.88%
2010	12.72%
2011	21.57%
2012	2.80%
2013	13.37%
2014	17.58%
2015	6.62%
2016	1.02%
2017	11.22%

## Notes To Required Supplementary Information

The information presented in the required supplementary schedules was determined as part of the actuarial valuation at the dates indicated. Additional information as of the latest actuarial valuation follows:

Valuation Date .....	June 30, 2017
Actuarial Cost Method.....	Entry Age
Amortized Method.....	Level Percentage of Payroll, Closed
Remaining Amortization Period.....	15 Years (single equivalent period)
Asset Valuation Method.....	3-Year Smoothed Market: 20% Corridor
Inflation .....	3.5% (price inflation)
Actuarial Assumptions:	
Investment Rate of Return.....	7.75%
Projected Salary Increase.....	3.5% to 11% (including 3.5% wage inflation)
Cost-of-Living Adjustments .....	2.4% Compound

# Required Supplementary Information

## Other Post-Employment Benefit (OPEB) Plan Schedule of Funding Progress for MoDOT and MSHP Medical and Life Insurance Plan

Year Ended June 30	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded AAL (UAAL) (b-a)	Funded Ratio (a/b)	Covered Payroll (c)	UAAL as a Percentage of Covered Payroll ((b-a)/c)
2008	\$0	\$1,178,303	\$1,178,303	0%	\$949,751	124%
2010 <sup>(1)</sup>	0	1,036,681	1,036,681	0%	930,172	111%
2012	0	1,048,333	1,048,333	0%	960,456	109%
2014	0	857,676	857,676	0%	1,203,673	71%
2016	0	908,347	908,347	0%	1,744,734	52%

<sup>(1)</sup> New assumptions adopted

Actuarial valuations are performed biennially. The July 1, 2015 actuarial valuation was used for FY2017 and FY2016 financial statements, the July 1, 2013 actuarial valuation was used for FY2015 and FY2014 financial statements, and the July 1, 2011 actuarial valuation was used for FY2012 and FY2013 financial statements, the July 1, 2009 actuarial valuation was used for FY2010 and FY2011 financial statements, and the July 1, 2007 actuarial valuation was used for FY2008 and FY2009 financial statements. This reporting requirement is being implemented prospectively, as prior years' data is not available.

Because this plan is an internal service fund of MoDOT, assets have not been set aside. Therefore, there is no actuarial value of assets. This results in a calculated funded ratio of zero percent.

### Notes to the OPEB Schedule of Funding Progress

The information presented in the required supplementary schedule was determined as part of the actuarial valuation at the date indicated. Additional information as of the latest actuarial valuation follows:

Valuation Date .....	July 1, 2015
Actuarial Cost Method .....	Projected Unit Credit
UAAL Amortization Method .....	Level Dollar Amount
UAAL Amortization Period .....	30 Years
UAAL Amortization Approach .....	Open
Investment Return (discount) Rate .....	4.0%
Healthcare Cost Trend Rate .....	7.0%, Decreasing to 4.5% in 2025
Admin Expense Trend (Inflation) Rate .....	4.0%

# Supplementary Information

## Schedule Of Administrative Expenses

For the Year Ended June 30, 2017

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### **Personal Services:**

Salary Expense	\$1,912,145
Employee Benefit Expense	1,480,485
<b>Total Personnel Services</b>	<b>3,392,630</b>

### **Professional Services:**

Actuarial Services	107,950
Audit Services	46,000
Legislative Consultant	30,000
Investment Special Consulting	15,000
Insurance Consultant	6,000
Other Consultant Fees	1,807
Fiduciary Insurance	11,830
IT Hosting and Support	226,477
Other	3,562
<b>Total Professional Services</b>	<b>448,626</b>

### **Miscellaneous:**

Depreciation	369,827
Meetings/Travel/Education	90,139
Equipment/Supplies	67,094
Printing/Postage	32,720
Bank Service Charge	9,036
Building Expenses	50,751
Other	54,635
<b>Total Miscellaneous</b>	<b>674,202</b>

<b>Total Administrative Expenses</b>	<b><u>\$4,515,458</u></b>
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# Supplementary Information

## Schedule Of Investment Expenses

For the Year Ended June 30, 2017

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### **Investment Income Expenses:**

#### Management and Performance Fees

Global Equity	\$ 2,346,355
Fixed Income Core	127,852
Opportunistic Debt	4,930,597
Real Estate	4,964,523
Private Equity	4,510,209
Real Assets	6,221,404
Hedge Funds	5,558,941
Cash	646,161

**Total Management and Performance Fees** 29,306,042

#### Investment Custodial Fee

54,308

#### Performance Management

173,663

#### General Consultant (Monitoring) Fee

322,059

#### Other Investment Expenses

604,802

**Total Investment Income Expenses** \$30,460,874

### **Securities Lending Expenses:**

#### Borrower Rebates

\$ 154,991

#### Bank Fees

118,810

**Total Securities Lending Expenses** \$ 273,801

# Supplementary Information

## Schedule Of Consultant And Professional Expenses

For the Year Ended June 30, 2017

<b><u>Professional/Consultant</u></b>	<b><u>Nature of Service</u></b>	
Levi, Ray & Shoup, Inc.	Information Technology	\$178,221
Gabriel, Roeder, Smith & Co.	Actuarial	107,950
Williams-Keepers, LLC	Financial Audit	46,000
Huber & Associates	Information Technology	44,055
Michael G. Winter Consultants, LLC	Legislative Consulting	30,000
Sikich, LLP	Information Technology	4,201
Evercore Group LLC	Market Research	15,000
Charlesworth Benefits	Risk Management Consulting	6,000
Alliant Insurance Services, Inc.	Director's & Officer's Insurance	10,712
Thompson Coburn, LLP	Legal Consulting	1,807
MO Division of Employment Security	Death Audit Services	456
LexisNexis Risk Data Management	Death Audit Services	600
MO Dept. of Health & Senior Services	Death Audit Services	630
Alliant Insurance Services, Inc.	Employee Crime Bond	1,118
The Berwyn Group	Death Audit Services	<u>1,876</u>
<b>Total Operating Consultant and Professional Expenses</b>		<b><u>\$448,626</u></b>
New England Pension Consultants	General Consulting/Monitoring	\$322,059
The Northern Trust Company	Performance Management	173,663
The Northern Trust Company	Investment Custodian	<u>54,308</u>
<b>Total Investment Consultant and Professional Expenses</b>		<b><u>\$550,030</u></b>

## **Maintaining your momentum on hills**

to reach your retirement goals can often seem like a roller coaster ride. Remember that keeping a steady pace both uphill and downhill by saving consistently, even if it is a small amount, will pay off when you want to tap into those savings in your retirement years.

# Chief Investment Officer Report



## MoDOT & Patrol Employees' Retirement System

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September 5, 2017

To the Board of Trustees and System Members:

It is my pleasure to provide you with the investment section of this year's Comprehensive Annual Financial Report (CAFR). My letter provides an overview of the investment portfolio's performance over the past year and our view of the investment market in the years to come.

The theme of this year's CAFR is the "road to retirement", with the investment section being responsible for "maintaining momentum on the hills". As I look back over the past 12 months, these were very appropriate themes for the investment markets. At the onset of the year, global equity markets were facing an uphill battle. Global economic growth was extremely weak, investors were still trying to determine the long-term implications of Britain's vote to exit the European Union, and the U.S. was in the midst of a hotly contested Presidential race. Fear and uncertainty were the primary emotions on the minds of investors. We fully anticipated a rocky, uphill road for the financial markets.

Surprisingly, over the coming months, Central Banks around the world pledged additional stimulus to support their respective economies, the dust settled rather quietly from the "Brexit" vote, and Donald Trump was elected the 45<sup>th</sup> President of the United States. The equity markets quickly embraced the idea of an improved regulatory and business tax environment and shifted from a sense of fear and uncertainty to one of cautious optimism. Equities rallied sharply after the U.S. election and "maintained their momentum" throughout the remainder of the fiscal year, closing up 18.8% for the year. Market volatility (sometimes referred to as the "fear index") ended the year at the lowest levels in over a decade, leading to a "risk on" rally across all major asset classes.

While the rally in the equity markets was admittedly unexpected, we're happy to take the results. MPERS' return of 11.22% (net of all management fees and based on time-weighted rates of return and market valuations) easily outpaced the actuarial return target of 7.75% and also outperformed the policy index return of 10.95%. We did fall short of the median public fund return of 11.9%, but that is somewhat expected in a year when the global equity market generated such strong results. MPERS' relatively low exposure to public equities typically results in lagging the broader public fund universe when equity markets are strong, but we also expect to outperform the average public fund in years where equity markets are flat or negative. Longer term, our diversified approach has served the system well, as MPERS' three, five, and ten year returns rank in the 5<sup>th</sup>, 6<sup>th</sup>, and 43<sup>rd</sup> percentile of the public fund peer universe. We also take comfort in knowing MPERS' portfolio has a lower risk profile than 75% of our peer group (with risk measured by standard deviation of returns over the past ten year period).

Each individual asset class delivered a positive return for the year, led by the global equity portfolio with a 20.89% return. The real assets portfolio, "fueled" by the recovery in the oil and gas markets, rebounded nicely from the losses in fiscal year 2016 to produce a 13.4% return for the year. The hedge fund portfolio also rebounded to generate a double digit return of 10.18%, followed by private equity at 9.92%, real estate at 6.74% and the fixed income portfolio at 3.69%. Relative performance (actual performance relative to the respective policy benchmark) was solid across most asset classes, with the exception of the private equity portfolio which struggled to keep up with the rally in public equity markets.

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# Chief Investment Officer Report

There was one significant change to MPERS' asset allocation during the year. Effective January 1, 2017, the Board approved a change to reduce the targeted allocation to hedge funds from 15% to 10% of assets. The reduction in hedge funds was offset by increasing the targeted allocation to real assets and opportunistic debt to 7.5% each (both previously had 5% targets). As part of the change, the opportunistic debt allocation was carved out and is now reported as a separate asset class rather than a subset of the broader fixed income allocation.

While MPERS' fiscal year return exceeded the actuarial target of 7.75% and MPERS' longer-term performance was strong enough to allow an additional \$31 million investment into the recently established contribution stabilization fund. The reserve fund now has a balance of \$220 million, which will be used to offset years when experience falls short of our actuarial goals. I commend the Board for their foresight in creating this fund, as it demonstrates a true alignment of interest with our members and will provide stability to our employers' contribution rates as we navigate this difficult investment climate.

As we look ahead to fiscal year 2018, financial markets seem to be facing the same uphill battle they faced at the start of last year – arguably an even steeper hill after the strong performance of last year. While President Trump and a Republican Congress certainly has the prospect of a more business-friendly environment, they have yet to pass any meaningful reforms and are at risk of losing momentum on many of their initiatives. The market rally over the past year clearly “pulled forward” the earnings growth that is expected from these initiatives, stretching equity valuations even further and increasing the risk of a pullback should the regulatory and tax reforms not materialize. We're now in the ninth year of the economic expansion since the financial crisis, and while I personally believe that expansions don't die simply from old age, you have to be mindful that a slowdown or correction is coming. Government bonds, normally a safe haven and source of diversification, offer very little in terms of yield and the Federal Reserve continues on a path to raise rates (which would send current bond prices lower).

All of this reinforces the need to be realistic about our return prospects, protect the corpus of the fund, and do everything under our control to “maintain momentum in the hills” that inevitably lie ahead. Doing so will require a balanced portfolio and the use of unique structures that can extract value from markets that otherwise appear fully valued.

Thank you for the opportunity to serve as your Chief Investment Officer, and I hope you enjoy this year's annual report.

Sincerely,



Larry Krummen, CFA

# Investment Consultant Report



**KEVIN M. LEONARD**  
PARTNER

September 2017

The Board of Trustees  
**MoDOT & Patrol Employees' Retirement System**  
PO Box 1930  
Jefferson City, MO 65102

Dear Board Members:

In our role as the general investment consultant, we assist the Board in several manners: determining and executing the overall asset allocation strategy of the Plan; advising on the investment policy of the Plan; facilitating investment manager searches (both traditional and alternative asset classes); conducting custodial service searches; providing ongoing performance evaluation for each individual investment manager and the overall investment portfolio; as well as providing pertinent education to the Board.

MPERS' objective is to provide service, disability, death and vested retirement benefits to members and their beneficiaries. To ensure a solid foundation for the future of the System, MPERS has developed an investment program designed to achieve the actuarially assumed rate of return over the long term, while prudently managing the risk of the portfolio. The pension plan is required to satisfy the need to pay accumulated/earned retirement benefits today, while at the same time be prepared for "uncertain" future benefits. This balancing of short-term versus long-term needs is a key tenant in the overall construction of the portfolio. To facilitate this balance, the Board has adopted a diversified asset allocation structure. Our goal is to diversify the System's assets within the traditional and non-traditional asset classes to reduce volatility, achieve above market returns, and to better protect the portfolio against difficult market conditions.

## **MPERS Fiscal Year 2017 Performance and Key Initiatives**

For the fiscal-year-ending June 30, 2017, the MPERS Total Plan returned 11.2% on a net-of-fees basis, outperforming the policy index return of 10.9%. For the fiscal-year-ending June 30, 2017, relative to the peer group comparison (InvestorForce Public Fund Universe), MPERS ranked in the 64<sup>th</sup> percentile (1<sup>st</sup> percentile being the highest, 100<sup>th</sup> percentile being the lowest), outpacing 36% of other public funds within the universe. For the fiscal year, total Plan performance (relative to policy index) was driven by strong absolute and relative returns within the Fund's global equity, real assets, and hedge fund portfolios. On a relative basis, the fixed income portfolio also performed strongly.

During Fiscal Year 2017, key initiatives accomplished included:

- Conducted a comprehensive review of the Plan's asset allocation in concert with NEPC's 2017 Client Actions and Asset Class Assumptions.

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# Investment Consultant Report



- As part of the review, NEPC and Staff evaluated the Plan's existing asset allocation and discussed any potential changes to its current structure.
  - Based on the review and discussions, coupled with the changes approved in FY2016 and implemented in FY2017, NEPC and Staff recommended that no changes be made to the current investment target allocation as the existing asset allocation remains suitable.
- A liquidity study was conducted as part of the asset allocation review.
  - The results of the liquidity study reaffirmed that the Plan's liquidity remains healthy enough to support the current allocation to alternative investments, but certain economic environments may change the liquidity profile of the Plan meaningfully.
- Continued work on the alternative investment portfolio.
  - A private market pacing plan was conducted for the opportunistic debt, private equity, real assets, and real estate portfolios. Each pacing plan provided a recommended commitment amount for upcoming vintage years and allocations to specific strategy types.
  - New strategies/managers were hired within the opportunistic debt, private equity, real assets, and real estate portfolios

As the asset allocation strategy evolves year-after-year, diversification and risk mitigation will continue to be the pillars of MPERS' asset allocation structure.

NEPC, LLC appreciates the opportunity to serve as your consultant. It is a pleasure to work with MPERS and we look forward to continuing our relationship for the benefit of the Board, Staff, and most importantly, the members of the System.

Sincerely,

A handwritten signature in black ink, appearing to read 'K. M. Leonard', written over a light blue horizontal line.

Kevin M. Leonard  
Partner

# Investment Activity Overview

## Summary of Investment Policy

The primary objective of the Missouri Department of Transportation and Highway Patrol Employees' Retirement System (MPERS) is to provide active and retired employees with the retirement benefits provided under Missouri law. The investment portfolio is constructed to generate a total return that, when added to employer contributions, is sufficient to meet these benefit obligations. Following prudent standards for preservation of capital, the goal is to achieve the highest possible rate of return consistent with the plan's tolerance for risk as determined by the Board of Trustees in its role as fiduciary. The Board has adopted a set of guiding principles to fulfill their fiduciary duty:

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

Risk awareness and risk management is essential to any organization. MPERS' investment policy is the starting point of our risk and investment management process. Through the investment policy, the Board defines the desired goals and outcomes of the investment program, including provisions that:

- Define the assumed rate of return for the portfolio (currently 7.75%).
- Establish an asset allocation that is expected to both meet the assumed rate of return while minimizing the impact of the fund's volatility to contribution rates.
- Define the approved asset classes and investment strategies.

- Delegate the day to day management of the investment portfolio to MPERS' staff and external asset managers.
- Establish a range of asset class allocations from which the CIO can operate.
- Establish procedures for hiring and terminating investment managers.
- Establish on-going due diligence requirements for existing managers.

Throughout the investment policy, two key investment beliefs stand out that govern the daily management of the investment portfolio:

- Diversification is critical because the future is unknown.
- Flexibility in investment policy implementation is critical because various asset classes will be in or out of favor at different points in the economic cycle.

To ensure the fund is operating within the risk parameters established in the investment policy, staff monitors the performance of the fund relative to MPERS' policy index. The policy index is the return that would be generated if MPERS' portfolio were invested passively across the targeted asset allocation. MPERS' investment staff strive to achieve returns that are equal to or greater than the policy index, while taking equal or less risk relative to the policy index (with risk defined by standard deviations of return). The table below shows how MPERS' portfolio compares to both the policy index and the median fund in MPERS' public fund peer universe as well as to commonly used risk measures.

## Total Portfolio – Statistical Performance

Portfolio Characteristics	1-Year	3-Year	5-Year	10-Year
<b>Annualized Total Plan Return</b>	<b>11.22%</b>	<b>6.20 %</b>	<b>9.82%</b>	<b>5.19%</b>
Annualized Policy Benchmark Return	10.90%	5.92%	8.40%	5.26%
Annualized Peer Median Return	11.90%	4.90%	8.20%	5.00%
<b>Total Plan Standard Deviation</b>	<b>1.94</b>	<b>3.44</b>	<b>3.65</b>	<b>8.14</b>
Policy Benchmark Standard Deviation	2.24	3.86	3.74	7.73
Peer Median Standard Deviation	3.40	6.20	5.90	9.60
<b>Total Plan Sharpe Ratio</b>	<b>5.55</b>	<b>1.75</b>	<b>2.65</b>	<b>0.57</b>
Policy Benchmark Sharpe Ratio	4.61	1.48	2.20	0.61
Peer Median Sharpe Ratio	3.30	0.70	1.4	0.50
<b>Correlation to Policy Benchmark</b>	<b>0.73</b>	<b>0.81</b>	<b>0.79</b>	<b>0.94</b>

\*As compared to the total fund policy benchmark

- Standard Deviation measures historical volatility and specifically measures the dispersion of a set of data points (i.e.: monthly returns) from their mean. If the data points are further from the mean, the standard deviation is higher.
- Sharpe Ratio measures historical volatility and specially measures the dispersion of a set of data points (ie: monthly returns) from their mean. If the data points are further from the mean, the standard deviation is higher.
- Correlation measures how the Fund's portfolio and the policy benchmark moves are related and if both are reacted to market forces in the same manner. The System's portfolio have a correlation of less than 1 indicating that while it will typically move in the same direction as the policy benchmark, it will not move in lockstep with the total policy benchmark.

# Investment Activity Overview

When evaluating these results, it's important to note that MPERS' policy index is comprised of a mix of asset classes, including several alternative asset classes with benchmarks that are not investable (notably private equity with its S&P 500 + 3% illiquidity benchmark, and real assets with its CPI + 4% real return benchmark). MPERS also evaluates investment performance on a net of fees basis, while acknowledging that most asset class benchmarks report performance on a gross of fees basis. Management fees represent a significant hurdle for staff to overcome when comparing results to MPERS' policy index, which is demonstrated by how well MPERS' policy index has performed relative to the broader public fund peer universe. MPERS' strong risk adjusted performance gives the Board confidence they have adopted a prudent investment strategy that is fulfilling their role as fiduciary to the System.

## **Fair Value of Investments**

As of June 30, 2017, MPERS' investment portfolio had a total fair value of \$2.164 billion, representing an increase of \$179 million from fiscal year-end 2016. Over the course of the year, an additional \$45 million was transferred out of the fund to meet benefit payments and other obligations.

When viewed together, the net increase to the portfolio from investment activity equated to \$224 million.

## **Investment Performance**

Fiscal year 2017 was a positive year for MPERS' investment portfolio from both a total return and a relative return perspective. The fund generated a 11.22% return for the year, net of all management fees and based on time-weighted rates of return and market valuations. The individual asset classes all delivered positive returns for the year, led by the global equity portfolio with a 20.91% return and the real assets and hedge fund portfolio both delivered double digit returns of 13.59% and 10.21%, respectively. The private equity, real estate and fixed income portfolios all generated positive returns of 9.86%, 6.72% and 3.73, respectively. As of January 1st, opportunistic debt was broken out as its own asset class but will not show performance across this timeframe because its performance is included in fixed income for the first six months of the fiscal year. Fiscal year 2018 will be the first full year of performance for the opportunistic debt portfolio. The performance across the major asset classes (and their respective benchmarks) is listed below.

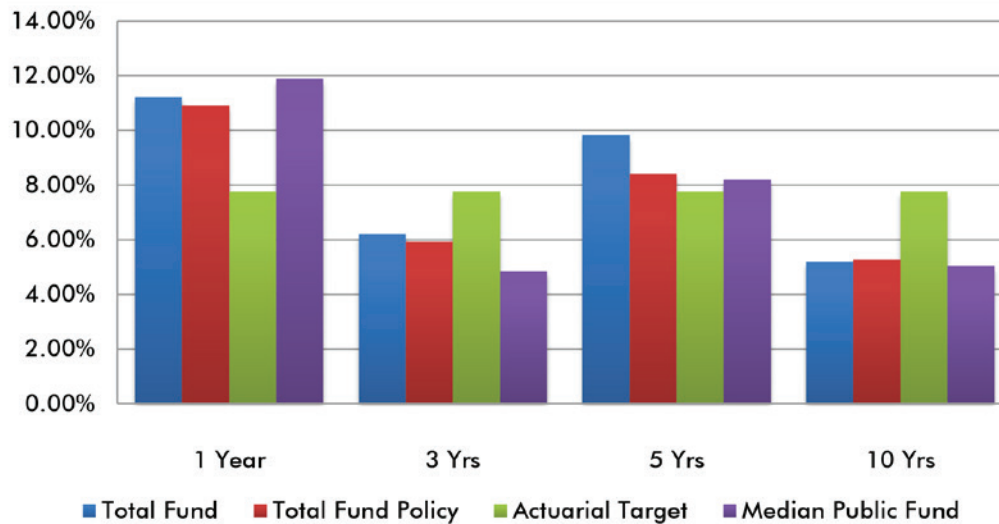
## **Investment Performance (including Benchmarks)**

	<b>1-Year</b>	<b>3-Year</b>	<b>5-Year</b>	<b>10-Year</b>
Total Fund	11.22%	6.20%	9.82%	5.19%
Policy Benchmark	10.90	5.92	8.40	5.26
Peer Universe Ranking (%)	64	5	6	43
Global Equity	20.91	5.73	12.36	4.51
MSCI ACWI	18.78	4.82	10.54	3.71
Private Equity	9.86	9.64	12.80	6.22
S&P 500 + 3%	20.64	13.66	16.67	9.91
Fixed Income	3.73	5.77	6.27	6.13
Barclays US Agg Gov/Credit	0.94	2.77	2.74	4.89
Opportunistic Debt	n/a	n/a	n/a	n/a
Barclays US Corp HY	n/a	n/a	n/a	n/a
Real Estate	6.72	9.92	12.99	4.88
NFI-ODCE	7.23	10.67	10.79	6.57
Real Assets	13.59	2.46	n/a	n/a
CPI + 4%	5.62	4.91	n/a	n/a
Hedge Funds	10.21	2.00	4.72	3.70
HFRI Fund of Funds	6.41	152	3.85	0.86

When evaluating performance, the Board of Trustees looks at three primary performance objectives: a) to meet or exceed the actuarial assumed rate of return of 7.75% over long periods of time, b) to outperform a policy benchmark

that represents the return that could be achieved by investing passively in the broad markets in the same percentages to MPERS' target asset allocation,

# Investment Activity Overview



MPERS' one year and five year returns were safely above the actuarial target, while MPERS' three year performance remains muted relative to the actuarial target hindered by the flat performance in fiscal year 2016. The ten year results remain below the 7.75% target as it reflects the poor market performance during the financial crisis of 2008 and 2009. The fund continues to perform well relative to policy benchmarks over most time periods. Performance relative to the public fund peer universe remains very strong, with the three and five year returns ranking in the top 5th and 6th percentile, respectively.

## **Asset Allocation Overview**

There was one significant revision to MPERS' asset allocation targets in fiscal year 2017. Effective January 1, 2017, the Board approved a reduction to

the target allocation to hedge funds (formerly 15%) to 10%. The change was offset by increasing the targeted allocation of real assets and opportunistic debt to 7.5% each (previously both had 5% targets). Additionally, the opportunistic debt portfolio was carved out of the broader fixed income allocation and is now reported as a separate asset class.

As of June 30, 2017, all of the sub-asset class allocations were within the acceptable ranges established by MPERS' investment policy. Any deviance relative to the target allocation represents a conscious decision based on the investment staff's view of the market. The chart below lists the target and actual asset allocation as of June 30, 2017, followed by commentary on each of the underlying asset classes.

Asset Class	FY2017 Target Allocation	Ending FY2017 Allocation
<b>Global Equity</b>	<b>30%</b>	<b>30.70%</b>
<b>Private Equity</b>	<b>15%</b>	<b>16.13%</b>
<b>Fixed Income</b>	<b>20%</b>	<b>15.17%</b>
<b>Opportunistic Debt</b>	<b>7.5%</b>	<b>9.03%</b>
<b>Real Assets</b>	<b>7.5%</b>	<b>10.25%</b>
<b>Real Estate</b>	<b>10%</b>	<b>10.43%</b>
<b>Hedge Funds</b>	<b>10%</b>	<b>6.90%</b>
<b>Cash</b>	<b>0%</b>	<b>1.39%</b>

# Investment Activity Overview

## **Global Equity:**

MPERS began the year with a 28.9% allocation to global equities, representing a slight underweight versus the targeted allocation of 30%. Given the fear and uncertainty in the markets at the start of the fiscal year, we maintained a slight underweight position throughout the first half of fiscal year 2017. We moved back to a neutral position in January of 2017, based on the falling market volatility and the improved regulatory and taxation outlook. We maintained a neutral to slight overweight position through the end of the fiscal year, finishing with a 30.7% allocation to global equities.

In terms of performance, global equity markets traded steadily higher over the course of fiscal year 2017, despite stretched valuations and threats of geopolitical issues. Active management (where utilized) added value throughout the entire equity portfolio as MPERS consistently outperformed the broader market indexes. MPERS' U.S. small-cap portfolio led the way, producing a 30.93% return for the year. U.S. large cap trailed the small-cap portfolio, but still generated a healthy 20.45% return. International markets fared well this year with our portfolio producing a 24.41%. Emerging markets also had a nice year, after being hit hard by commodity and oil prices in 2016. MLPs continue to be a strong yielding asset, yielding about 6%, but also continues to underperform the broader equity indexes as investors are allowing oil prices to affect MLP prices.

The strong performance in global equities provided an excellent opportunity to take some gains and redeploy that capital into other areas of the portfolio where we found better opportunities. Most of that activity involved reducing active management risk throughout the equity portfolio and shifting towards an internally-managed strategy utilizing derivatives. Publicly traded equity markets are very efficient, and the passive benchmarks are often difficult to outperform on a net of fees basis. For this reason, we believe MPERS is better served by taking active management risk in other areas of the portfolio where managers have demonstrated a better ability to outperform their passive benchmarks, such as the alternative asset classes. We will continue to use active equity management strategies where a manager has a certain niche or in markets that are less efficient. For example, in March of 2017, we provided the seed capital for an existing manager to start an international micro-cap strategy. That particular manager has an excellent track record of outperforming the passive benchmark in smaller markets, which we expect will continue with the new micro-cap strategy.

## **Fixed Income:**

Effective January 1, 2017, the opportunistic debt portfolio was carved out of the broader fixed income allocation and is now reported as a separate asset class. Fixed income performance for fiscal year 2017 includes the first 6 months

where opportunistic debt was rolled into the broader fixed income allocation, and the back half of the year where returns were exclusively from traditional fixed income strategies. Regardless of whether you include opportunistic debt or not, MPERS' was consistently underweight the targeted fixed income allocation of 20% throughout the entire year, ending the year just above the minimum permissible range with a 15.17% allocation.

Maintaining the appropriate allocation to fixed income in the current interest rate environment continues to be a balancing act. While fixed income strategies (particularly long duration Treasuries) offer the best diversification against equity market risk and other various strategies dependent on economic growth, we are also mindful of the difficulty of meeting MPERS' long term actuarial return target of 7.75%. At the start of the fiscal year, the 30 year Treasury had a yield of 2.25%. Simple mathematics will tell you that for every dollar you invest that earns 2.25%, you need to invest another dollar in "something" that earns 13.25% to generate an average return of 7.75%. While equity markets delivered returns exceeding 13.25% this year, nobody believes that can be sustained over longer periods of time. That leaves pension funds with a dilemma; while U.S. Treasuries provide excellent diversification, investing any considerable amount of funds in them virtually guarantees you won't meet your actuarial return hurdle. MPERS tries to balance this risk by mixing a blend of fixed income strategies, including core fixed income strategies that offer a modest coupon with limited exposure to rising interest rate risk, inflation protected securities that will perform better in rising inflation periods, long duration securities, and opportunistic credit strategies (which will be broken out into a separate asset class going forward).

It was a challenging year for core fixed income investors, as investors sold their less risky fixed income securities to buy into the strong equity markets (sending bond prices lower and yields higher). Long duration fixed income fared the worst, as the 30 year U.S. Treasury yield rose from 2.25% to 2.84% over the year. Opportunistic credit strategies fared much better, as the "risk on" rally led to tighter credit spreads which more than offset the rise in interest rates (an improving economy reduces the default risk of the underlying borrowers). While the overall fixed income portfolio generated a positive 3.73% return for the year, the gains were almost exclusively from opportunistic credit strategies. MPERS' long duration portfolio lost 2.16% for the year, while the core portfolio lost 0.7% and the inflation sensitive portfolio generated a modest 0.34% return. The divergence of goals, objectives, and ultimately the returns between opportunistic and traditional fixed income securities is the primary reason we opted to carve out the opportunistic debt portfolio into a stand-alone asset going forward.

# Investment Activity Overview

Looking ahead, we intend to maintain the underweight position to traditional fixed income securities. While the 30 year Treasury yield rose to 2.84% over the course of fiscal year 2017, using the same math as before you still need to find an offsetting investment that returns 12.66% to generate an average return of 7.75% (MPERS' actuarial hurdle). While the U.S. Treasury bonds are certainly free of default risk, they are not risk free as all fixed income securities (especially long duration) have a considerable amount of interest rate risk (market pricing risk). Given the Federal Reserve is still on a path to raise short term rates further (which can add volatility to fixed income assets), we continue to believe that better risk-adjusted investments are available elsewhere in the investment portfolio.

## **Hedge Funds:**

Performance in the hedge fund portfolio rebounded in fiscal year 2017 to generate a return of 10.21%, which outperformed the benchmark return of 6.41%. Most of the outperformance can be attributed to a higher equity exposure through our equity-oriented strategies, which ironically were the drivers of the underperformance in fiscal year 2016. While we are happy to see the improved performance, we are also mindful that equity valuations are considerably higher today which makes it harder to generate those same returns going forward. The changing regulatory and political environment has proven to be quite a challenge for most hedge fund strategies, and many are struggling to adapt and navigate their approach. We believe that paying the high fees associated with hedge funds in this difficult return environment is not prudent, and have maintained a considerable underweight to the new 10% allocation target throughout the year. We ended with a 6.90% allocation, continuing to favor opportunities in real estate, real assets, and private equity relative to the hedge funds sector.

## **Real Assets:**

The real assets portfolio rebounded from poor performance in the previous year to generate a return of 13.59% in fiscal year 2017, versus a policy benchmark of 5.62%. Performance was strong across the board, as the aviation, energy, mining, and shipping strategies all performed well. Timber also contributed positively to absolute performance in the first full year of MPERS' revised Timber and Natural Resources' policy. The new authority has generated a tremendous amount of deal flow, and we closed several attractive throughout fiscal year 2017. We are very pleased with the early success of the new program, and continue to source additional investments to complement the existing asset base.

We ended the year with a 10.25% allocation to real assets, with roughly 3% of the portfolio in timber. We continue to see a number of attractive investments throughout the asset class, particularly in timber and in the energy sector, and

expect the allocation to increase towards the high end of the permissible range of 12.5% throughout the coming year(s).

## **Real Estate:**

MPERS' real estate portfolio has a target allocation of 10% of assets, and includes a mix of public and private equity strategies, along with tactical exposures to public and private debt strategies. We continue to favor a mix of real estate debt and equity strategies over the core private equity real estate benchmark, as it offers a comparable dividend yield relative to the index but provides additional downside protection from our debt allocations. The benchmark has proven difficult to keep up to however, as our blended portfolio generated a 6.72% return for the year but marginally underperformed the policy benchmark return of 7.23%.

We started the fiscal year with 11.69% allocation to real estate, a moderate overweight position, on the view that our diversified portfolio would outperform traditional fixed income markets. As the year progressed, capitalization rates (the equivalent of dividend yields) in real estate continued to fall and we gradually reduced our overweight by redeeming from our core real estate portfolio, ending fiscal year 2017 with a 10.43% allocation. We are mindful of the strong correlation between core real estate and interest rates, and believe that capitalization rates on core real estate have hit their lows for the current cycle. Net operating income for real estate properties has been excellent (driven by higher rental rates), but the market is also pricing in very aggressive rental rate growth going forward. So while we continue to believe real estate is attractive relative to traditional fixed income, the overall risk profile of core real estate has also increased. Looking forward, we are looking to reduce our core real estate exposure in favor of other strategies that offer a better forward-looking return profile.

## **Private Equity:**

MPERS was consistently overweight the targeted allocation of 15% to private equity throughout fiscal year 2017, although that allocation dropped from 17.57% to 16.13% over the course of the year. The portfolio generated a 9.86% return for the year, underperforming the "public equity plus" benchmark (S&P 500 + 3%) which generated a 20.64% return. This benchmark has been difficult to outperform in recent years given the strength of public equity markets and the relative immaturity of MPERS' private equity portfolio. The portfolio is maturing, as fiscal year 2017 was the third consecutive year where distributions (from portfolio company sales) outpaced new capital calls. We remain optimistic that relative performance will improve as the underlying companies advance toward their ultimate exit strategy.

While we are comfortable with the progress of the private equity portfolio, keeping up with the "public equity plus"



# Investment Activity Overview

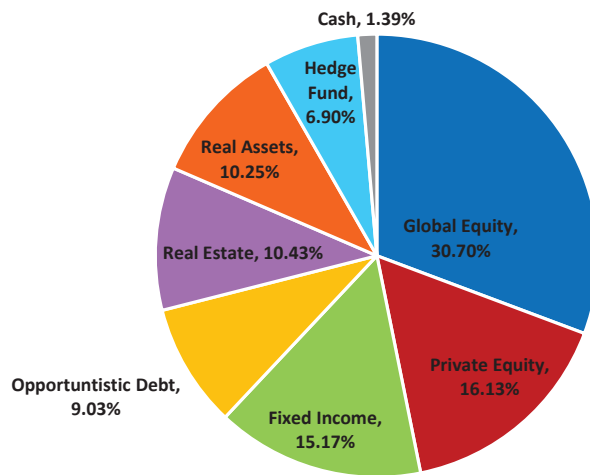
benchmark has been a difficult task. Some of that is clearly a matter of bad timing, as the benchmark converted to the current hurdle just as equity markets started to recover from the financial crisis. MPERS is a long term investor, and trends like this have a way of reversing over time. The private equity portfolio remains our best performing strategy over the trailing ten year period, but has simply struggled with the benchmarking issue. While we don't ever want to wish for bad performance in the public equity markets, we fully expect the private equity portfolio will outperform policy benchmarks when public equity markets are having difficulties. Mindful of all these issues, we continue to cautiously, but actively, commit to new managers and strategies – favoring smaller, niche managers who are not “fishing in a crowded pond.” These managers have a more repeatable strategy that is compelling even in the low return environment that we face today.

## **Looking Forward**

As we look to fiscal year 2018, the same challenges remain that we noted going into the past few years. Interest rates are at very low levels and equity market valuations are at the high end of their historical ranges. We need to be realistic about return prospects going forward. Last year, the global equity markets shrugged off all the uncertainty and delivered excellent results, helping MPERS' portfolio generate an 11.22% return. It will be very difficult for the markets to repeat that performance going forward.

The Federal Reserve has raised rates four times in the last two years, and more rate hikes are expected in fiscal year 2018. With interest rates at historic low yields, and the Federal Reserve contemplating how much - versus whether or not - to raise interest rates, the traditional fixed income markets don't offer the safe haven they have in years past. With all the uncertainty, it feels like a better time to be cautious and rely on MPERS' diversified mix of assets and strategies to grind out solid returns without subjecting the portfolio to any concentrated risks of one sector.

# Investment Summary



## Amounts Reported by Management-Type Allocation

	06/30/2016				06/30/2017		
	Book Value	Fair Value	Acquisitions	Dispositions	Book Value	Fair Value	% of Fair Value
Global Equity	\$ 500,268,685	\$ 575,532,020	\$ 218,548,192	\$ (178,551,926)	\$ 540,264,951	\$ 664,326,249	30.70%
Private Equity	353,797,958	348,785,990	79,420,262	(84,285,719)	348,932,501	348,961,860	16.13%
Fixed Income	436,948,045	456,656,835	184,376,636	(116,047,896)	505,276,785	523,740,585	24.20%
Real Estate	196,723,331	248,984,725	61,276,210	(60,219,016)	197,780,525	225,733,198	10.43%
Real Assets	111,172,207	148,461,085	152,013,530	(42,132,781)	221,052,956	221,757,659	10.25%
Hedge Funds	220,990,593	155,481,104	18,422,761	(126,202,127)	113,211,227	149,231,205	6.90%
Cash	22,456,478	51,087,298	444,345,473	(436,825,783)	29,976,168	29,976,215	1.39%
<b>Total Investments</b>	<b>\$1,842,357,297</b>	<b>\$1,984,989,057</b>	<b>\$1,158,403,064</b>	<b>\$(1,044,265,248)</b>	<b>\$1,956,495,113</b>	<b>\$2,163,726,971</b>	<b>100.00%</b>

### Reconciliation to Statement of Plan Net Assets:

Less Accrued Investment Interest and Income	(5,686,056)
Less Investment Sales Receivable	(4,073,357)
Plus Investment Purchases Payable	8,186,805
Currency Adjustment	109,789
	<u>\$2,162,264,152</u>

# Largest Investment Holdings

## Largest Equity Securities

(Non-Commingled Funds)

Security	Fair Value	% of Total
WILLIAMS CO INC COM	\$1,719,601	0.085%
LAM RESH CORP COM	1,301,156	0.064%
ROYAL CARIBBEAN CRUISES COM STK	1,288,914	0.064%
TARGA RES CORP COM	1,165,211	0.058%
QORVO INC COM	1,098,285	0.054%
REGENERON PHARMACEUTICALS INC COM	982,280	0.048%
LUMENTUM HLDGS INC COM	960,722	0.047%
COGNEX CORP COM	899,940	0.044%
FORESTAR GROUP INC	817,420	0.040%
TRIMBLE INC COM TRIMBLE INC	813,276	0.040%

## Largest Fixed Income Securities

(Non-Commingled Funds)

Par Value	Security	Fair Value
14,000,000	USA TREASURY NTS 1.125% TIPS 15/1/21 USD1000 01-15-2021	\$16,251,162
15,311,684	MISSOURI HIGHER ED LN AUTH STUD LN REV VAR-SER A-1 VAR RT DUE 11-26-2032 REG	15,229,154
15,000,000	UNITED STATES TREAS BDS 2.25% DUE 08-15-2046	13,205,865
11,400,000	UNITED STATES OF AMER TREAS BONDS 2.75 BDS DUE 08-15-2042 USD100'BONDS 08/42'	11,275,307
10,000,000	UNITED STATES OF AMER TREAS BONDS 0.75 DEB TIPS 02-15-2042	10,296,546
10,513,000	PVTPL ED LN AST-BACKED TR I 2013-1 SR NTCL A2 144A VAR RT DUE 04-26-2032 BEO	10,271,884
9,166,000	TVA 6.235 BD DUE 07-15-2045 ONE-TIME OPTPUT PAY 7-15-2001 @ PAR LAST NOTF 1**PUT	10,268,871
10,000,000	PVTPL SLM STUD LN TR 2003-11 STUD LN BKDSECS 144A A-6 VAR RT DUE 12-15-25	10,036,000
10,000,000	FFCB DTD 2.93 04-27-2029	9,976,600
10,000,000	UNITED STATES OF AMER TREAS BONDS DTD 05/15/2016 2.5% DUE 05-15-2046 REG	9,303,520
9,150,000	BRAZOS HIGHER ED AUTH INC STUD LN BKD NT2007-1 CL I-A-4 VAR RT DUE 06-25-2043	8,969,851
9,600,000	EDUCATION LN ASSET BACKED TR I FLTG RT 4.25% 08-01-2043 REG	8,304,000
7,800,000	SC STUD LN CORP REV VAR-STUD LN BKD NTS-A-4 VAR RT 09-03-2024 REG TAXABLE	7,850,310
6,000,000	UNITED STATES TREAS BDS INDEX LINKED 1.75 DUE 01-15-2028 REG	7,806,259
430,227	CF OWL ROCK CAPITAL CORPORATION	6,474,919
7,140,000	CMO WACHOVIA BK COML MTG TR COML MTG PASS-TH DUE 12-15-2043 REG	6,203,510
6,053,640	SLM STUDENT LN TR 2012-2 STUDENT LN BKD NTS CL A FLTG 01-25-2029 REG	6,065,959
5,900,000	PVTPL CIFC FDG 2013-I LTD SER 2013-1A CLA-1 VAR RT 04-16-2025	5,905,990
5,864,207	PVTPL CMO TRU TR COML MTG PASS SER 2016-TOYS CL A FLTG 11-15-2030	5,869,039
5,447,244	SLM STUDENT LN TR 2008 9 STUDENT LOAN BKD NTS CL A FLTG 04-25-2023 REG	5,563,194

Space and cost restrictions make it impractical to print the entire investment portfolio in this report. However, a portfolio listing is available for review in the office of the executive director of MPERS.

# Schedule of Investment Expenses

	Fair Value of Assets Under Management at 6/30/2017	Fees Accrued During FY2017
<b>Management and Performance Fees:</b>		
Equities	\$ 664,326,249	\$ 2,346,355
Fixed Income Core	328,314,319	127,852
Opportunistic Debt	195,426,266	4,930,597
Real Estate	225,733,198	4,964,523
Private Equity	348,961,860	4,510,209
Real Assets	221,757,659	6,221,404
Hedge Funds	149,231,205	5,558,941
Cash	29,976,215	646,161
<b>Total Management and Performance Fees</b>	<b><u>\$2,163,726,971</u></b>	<b><u>\$29,306,042</u></b>
Investment Custodial Fee		54,308
Performance Management		173,663
General Consultant (monitoring) Fee		322,059
Other Investment Expenses		604,802
<b>Total Investment Income Expenses</b>		<b><u>\$30,460,874</u></b>
<b>Securities Lending Expenses:</b>		
Borrower Rebates (Refunds)		\$ 154,991
Bank Fees		118,810
<b>Total Securities Lending Expenses (Income)</b>		<b><u>\$ 273,801</u></b>

# Schedule of Brokerage Commissions

<b>Brokerage Firm</b>	<b>Total Commission</b>	<b>Number of Shares</b>	<b>Commission Rate</b>
JCREDIT SUISSE SECURITIES (USA) LLC	\$24,067.20	6,403,201	\$0.0038
KCG AMERICAS LLC/KD	22,309.37	2,605,520	0.0086
CONVERGEX EXECUTION SOLUTIONS LLC	15,783.00	364,550	0.0433
CITATION GROUP (THE)	12,119.00	289,100	0.0419
BTIG LLC	11,457.39	391,430	0.0293
CAP INSTITUTIONAL SERVICES INC-EQUITIES	7,516.46	545,551	0.0138
WM SMITH & CO	7,164.19	231,797	0.0309
WEEDEN AND CO	5,519.16	475,499	0.0116
KEEFE BRUYETTE	3,747.89	112,850	0.0332
BARCLAYS BANK PLC (ALL U.K. OFFICES)	3,495.10	159,452	0.0219
GABELLI & COMPANY	2,713.00	54,900	0.0494
CITIGROUP GLOBAL MARKETS INC.	2,593.67	991,411	0.0026
MORGAN STANLEY & CO. LLC	2,411.02	30,383,067	0.0001
RBC CAPITAL MARKETS, LLC	2,353.44	65,477,750	0.0000
CRAIG - HALLUM	2,255.12	92,132	0.0245
J.P. MORGAN SECURITIES LLC	2,172.45	2,124,063	0.0010
STIFEL NICOLAUS & CO, INCORPORATED	2,153.90	58,828,585	0.0000
UBS	2,089.84	326,978	0.0064
GOLDMAN, SACHS AND CO.	1,810.72	467,952	0.0039
WELLS FARGO BANK MINNESOTA NA	1,586.85	45,461,146	0.0000
JEFFERIES INTERNATIONAL LTD	1,585.99	68,552	0.0231
SANDLER O'NEILL & PARTNERS L.P.	1,552.54	43,042	0.0361
DEUTSCHE BANK SECURITIES INC.	1,543.00	139,167	0.0111
KEMPEN AND CO N.V.	1,444.70	66,597	0.0217
CLSA	1,281.91	329,596	0.0039
COWEN AND COMPANY LLC	1,264.00	31,600	0.0400
ISI GROUP INC.	1,239.66	96,057	0.0129
CANTOR FITZGERALD & CO.	1,210.42	58,798	0.0206
STEPHENS INC.	1,158.72	30,636	0.0378
IMPERIAL CAPITAL LLC	1,122.62	33,736	0.0333
MERRILL LYNCH	1,060.03	42,940,847	0.0000
JP MORGAN SECURITIES	1,028.96	226,354	0.0045
OTHER (66 firms less than \$1,000 each)	15,089.42	666,191,557	0.0000
<b>Total</b>	<b>\$ 165,901</b>	<b>926,043,474</b>	
<b>Average Commission Rates</b>			<b>\$0.0002</b>

# Notes

A photograph of a road closure. A white sign with a black border and reflective grid pattern is mounted on a white and red striped barrier. The sign reads "ROAD CLOSED" in large, bold, black capital letters. The road is paved and has a yellow double line. In the background, there is a grassy area, a body of water, and a line of trees under a blue sky with light clouds. A white sandbag is visible on the ground near the barrier.

**ROAD  
CLOSED**

## **Avoiding road blocks**

on your way to a well-deserved retirement may be easier said than done. If you are faced with unexpected financial emergencies, carefully consider your options before you tap into retirement funds or stop saving. Do not hesitate to call MPERS with your retirement plan questions.

# Actuary's Certification Letter



800.521.0498 | P: 248.799.9000 | F: 248.799.9020 | [www.grsconsulting.com](http://www.grsconsulting.com)

September 18, 2017

Retirement Board  
Missouri Department of Transportation  
and Highway Patrol Employees' Retirement System  
1913 William Street  
Jefferson City, Missouri 65102-1930

Ladies and Gentlemen:

This report was prepared at the request of the Board and is intended for use by the Retirement System and those designated or approved by the Board. This report may be provided to parties other than the System only in its entirety and only with the permission of the Board. GRS is not responsible for unauthorized use of this report. This report should not be relied on for any purpose other than the purpose described.

The basic financial objective of the Missouri Department of Transportation and Highway Patrol Employees' Retirement System (MPERS) 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
- (2) when combined with present assets and future investment returns, will be sufficient to meet the present and future financial obligations of MPERS.

In order to measure progress toward this fundamental objective, MPERS has annual actuarial valuations performed. The valuations (i) measure the present financial position, and (ii) establish contribution rates that provide for the current cost and level percent-of-payroll amortization of unfunded actuarial liabilities over a reasonable period. An actuarial valuation was performed based upon benefit conditions, data and assumptions as of June 30, 2017. This valuation indicates that contribution rates for the period beginning July 1, 2018 that are at least equal to the calculated contribution rates will meet the Board's financial objective. The calculated contribution rates are 58.00% of payroll for the 6,192 Non-Uniformed employees and 58.00% of payroll for the 1,264 Uniformed patrol employees.

The plan administrative staff provides the actuary with data for the actuarial valuation. The actuary relies on the data after reviewing it for internal and year to year consistency. Member data was not audited by the actuary. The actuary summarizes and tabulates population data in order to analyze longer term trends. We are not responsible for the accuracy or completeness of the data provided by MPERS.



# Actuary's Certification Letter

Retirement Board  
September 18, 2017  
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Gabriel, Roeder, Smith & Company was responsible for the following schedules found in the Actuarial Section:

- Summary of Actuarial Assumptions and Methods
  - Probabilities of Separation from Active Employment
  - Individual Salary Increases
  - Joint Life Retirement Values
  - Probabilities of Retirement for Members
  - Probabilities of Disability for Members
- Summary of Member Data Included in Valuations
  - Active Members by Attained Age and Years of Service
  - Schedule of Active Member Valuation Data
- Solvency Test
- Derivation of Financial Experience
- Schedule of Retirees and Beneficiaries Added and Removed
- Summary of Plan Provisions
- Legislative Changes

Gabriel, Roeder, Smith & Company was responsible for the following schedules found in the Financial Section:

- Schedule of Changes in the Employer's Net Pension Liability
- Schedule of Employer's Net Pension Liability
- Schedule of Employer Contributions
- Schedule of the Actuarially Determined Contributions

Actuarial valuations are based upon assumptions regarding future activity in specific risk areas including the rates of investment return and payroll growth, eligibility for the various classes of benefits, and longevity among retired lives. These assumptions are adopted by the Board. The assumptions and the methods comply with the requirements of the Governmental Accounting Standards Board. Each actuarial valuation takes into account all prior differences between actual and assumed experience in each risk area and adjusts the contribution rates as needed. Actuarial methods and assumptions were adopted by the Board pursuant to the June 30, 2012 Experience Study. Gabriel, Roeder, Smith & Company has produced the following reports as of June 30, 2017:

- Annual Actuarial Valuation Report
- GASB Nos. 67 and 68 Valuation Report

In order to gain a full understanding of the condition of this plan, these reports should be read in their entirety.

# Actuary's Certification Letter

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To the best of our knowledge, the report is complete and accurate and was made in accordance with standards of practice promulgated by the Actuarial Standards Board. The actuarial assumptions used for the valuation produce results which, individually and in the aggregate, are reasonable.

The employer contributions determined in this report are based on Board funding policy. This policy is discussed on page 4 of the annual actuarial valuation report. We commend the Board for its aggressive monitoring and updating of the funding policy over the recent past. However, continued employer contributions at the current level do not guarantee benefit security. We therefore encourage the Board to continue to routinely monitor and update its funding policy and to continue to consider benefit security when doing so.


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 report has been prepared by individuals who have substantial experience valuing public employee retirement systems. Heidi Barry is a Member of the American Academy of Actuaries (MAAA) and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

The signing individuals are independent of the plan sponsor.

Based upon the valuation results, it is our opinion that the Missouri Department of Transportation and Highway Patrol Employees' Retirement System continues to operate in accordance with actuarial principles of level percent-of-payroll financing. It is important to the well-being of the System that it continues to receive contributions at the actuarially determined levels. It is also important to continue to monitor both the total funded status and the funded status of the retiree liabilities to ensure that the funding policy is consistent with the expected life span of the respective unfunded obligation.

Respectfully submitted,

  
Heidi G. Barry, ASA, MAAA

  
Kenneth G. Alberts

# Summary of Actuarial Methods and Assumptions

Valuation Date:.....	June 30, 2017
Actuarial Cost Method:.....	Entry Age
Amortized Method:.....	Closed, level percent of payroll
Remaining Amortization Period:.....	15 years (single equivalent period)
Asset Valuation Method:.....	3-year smoothing
Actuarial Assumptions:	
Investment Rate of Return:.....	7.75%
Projected Salary Increase:.....	3.50% to 11.00%
Cost-of-Living Adjustments:.....	2.40% Compound
Includes Wage Inflation at: .....	3.50%

An actuarial valuation is based upon an actuarial cost method, an asset valuation method, and actuarial assumptions. These methods and assumptions are chosen by the Board of Trustees after consultation with the Actuary and other advisors.

The actuarial cost method is called the Entry Age Actuarial Cost Method. This method is consistent with the Board's level percent-of-payroll funding objective. With this method, the level percent-of-payroll is determined that will fund a member's retirement benefit over the member's entire working lifetime, from date of hire (Entry Age) to date of exit from the active member population. Differences in the past between assumed and actual experience become part of unfunded actuarial accrued liabilities and are amortized with level percent-of-payroll contributions. This cost method was first used in the June 30, 1999 valuation.

The asset valuation method is a three-year smoothed market value method in which assumed investment return is recognized immediately each year and differences between actual and assumed investment return are phased-in over a closed three-year period. This asset valuation method is intended to give recognition to the long term accuracy of market values while filtering out and dampening short term market swings. This method was first used in the June 30, 1999 valuation.

The actuarial assumptions used in producing the valuation fall into two broad classes: economic assumptions, and demographic assumptions. Economic assumptions refer to long term rates of investment return, wage growth, covered population growth, and inflation. Demographic assumptions refer to retirement rates, turnover rates, disability rates, merit and seniority pay increases, and mortality rates. The current assumptions are based upon a 2007-2012 study of experience of the MPERS. The assumptions are reviewed from time to time to keep them reasonably current with expected experience. The next experience study is scheduled to follow the June 30, 2017 valuation.

## **Economic Assumptions**

**The investment return rate** used in making the valuation was 7.75% per year, compounded annually (net after administrative expenses). This rate of return is not the assumed real rate of return. The real rate of return over wage inflation is defined to be the portion of investment return which is more than the wage inflation rate. Considering wage inflation recognition of 3.50%, the 7.75% rate translates to an assumed real rate of return over wage inflation of 4.25%. This rate was first used for the June 30, 2013 valuation.

**Pay increase assumptions** for individual active members are shown on the Salary Increase Assumptions table. Part of the assumption for each age is for a merit and/or seniority increase, and the other 3.50% recognizes wage inflation. These rates were first used for the June 30, 2013 valuation.

# Summary of Actuarial Methods and Assumptions

**Price Inflation** is assumed to be 3.00%. This results in a 2.4% annual COLA assumption. It is assumed that the 2.4% COLA will always be paid.

The Active Member Group size is assumed to remain constant at its present level.

**The active member payroll** all members is assumed to increase 3.50% annually.

## **Non Economic Assumptions**

**The mortality table** used to measure retired life mortality was the RP-2000 Combined Healthy Mortality Tables projected 16 years and set back 1 year for males and females. Related values are shown on Joint Life Retirement Values table. This table was first used for the **June 30, 2013** valuation. Disabled pension mortality was based on PBGC Disabled Mortality tables. The healthy mortality tables include a margin for mortality improvement. The margin is in the 16-year projection. The disabled mortality tables do not include a margin for mortality improvement.

**The probabilities of retirement** for members eligible to retire are shown on the Rates of Retirement table. The rates for full retirement were first used in the **June 30, 2013** valuation. The rates for reduced retirement were first used in the **June 30, 2013** valuation. Upon retirement, members are assumed to pick the BackDROP period that when combined with the remaining annuity produces the highest liability.

**The probabilities of disability** for members eligible to retire are shown on Rates of Disability table. The rates for disability were first used in the **June 30, 2013** valuation.

**The probabilities of withdrawal** from service, death in service and disability are shown for sample ages on the Probabilities of Separation tables. The death-in-service and disability rates were first used in the **June 30, 2013** valuation. The withdrawal rates were first used in the **June 30, 2013** valuation.

**The data about persons now covered and about present assets** was furnished by the System's administrative staff. Although examined for general reasonableness, the data was not audited by the Actuary. Data was furnished as of May 31 and assumed to be statistically equivalent to June 30.

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

# Summary of Actuarial Methods and Assumptions

## Probabilities of Separation From Active Employment Less Than 5 Years of Service

Service	MoDOT, Civilian Patrol and MPERS		Uniformed Patrol	
	Male	Female	Male	Female
0-1	30.00%	20.00%	10.00%	10.00%
1-2	16.00	14.00	7.00	7.00
2-3	9.00	11.00	3.25	3.25
3-4	7.00	9.00	3.00	3.00
4-5	5.50	5.00	2.75	2.75

## Probabilities of Separation From Active Employment More Than 5 Years of Service

Age	MoDOT, Civilian Patrol and MPERS		Uniformed Patrol	
	Male	Female	Male	Female
25	5.75%	5.10%	2.70%	2.70%
30	5.12	5.10	2.70	2.70
35	4.12	4.59	1.91	1.91
40	3.21	3.74	1.13	1.13
45	2.41	2.89	0.79	0.79
50	1.76	2.04	0.46	0.46
55	1.29	1.19	0.23	0.23
60	1.04	0.34	0.17	0.17

# Summary of Actuarial Methods and Assumptions

## Salary Increase Assumptions For an Individual Member

### Age Based Salary Scale

Age	MoDOT, Civilian Patrol and MPERS			Uniformed Patrol		
	Merit & Seniority	Base (Economic)	Increase Next Year	Merit & Seniority	Base (Economic)	Increase Next Year
20	4.40%	3.50%	7.90%	6.00%	3.50%	9.50%
25	3.18	3.50	6.68	4.25	3.50	7.75
30	2.59	3.50	6.09	2.48	3.50	5.98
35	2.09	3.50	5.59	1.54	3.50	5.04
40	1.44	3.50	4.94	1.09	3.50	4.59
45	0.68	3.50	4.18	0.71	3.50	4.21
50	0.12	3.50	3.62	0.45	3.50	3.95
55	0.00	3.50	3.50	0.29	3.50	3.79
60	0.00	3.50	3.50	0.23	3.50	3.73

### Service Based Salary Scale

MoDOT, Civilian Patrol and MPERS		Uniformed Patrol	
% Merit Increases in Salaries Next Year*		% Merit Increases in Salaries Next Year*	
Service Index	Rate	Service Index	Rate
1	8.0%	1	10.0%
2	7.0%	2	10.0%
3	4.5%		
4	4.0%		

\*For Non-Uniformed members with 4 or less years of service and Uniformed members with 2 or less years of service, the service based table overwrites the age based table above.

## Joint Life Retirement Values (7.75% Interest)

Sample Attained Ages	Present Value of \$1 Monthly for Life		Percent Dying Next Year		Future Life Expectancy (years)	
	Men	Women	Men	Women	Men	Women
50	\$147.46	\$147.37	.1516%	.1159%	33.34	35.39
55	142.23	142.00	.2313%	.2064%	28.61	30.63
60	135.19	134.87	.4593%	.4099%	24.03	26.02
65	126.18	125.80	.9002%	.7955%	19.69	21.67
70	115.18	114.73	1.5803%	1.3715%	15.71	17.66
75	101.84	101.56	2.6618%	2.2752%	12.07	14.01
80	86.45	86.42	4.8531%	3.7094%	8.86	10.73

The present values shown above are for illustrative purposes only and include a 50% survivor benefit but do not include the value of future post-retirement increases. Males are assumed to be 3 years older than their spouses.

# Summary of Actuarial Methods and Assumptions

## Percent of Eligible Active Members Retiring Next Year (Rates of Retirement)

### Closed and Year 2000 Plans

Age	MoDOT, Civilian Patrol and MPERS				Uniformed Patrol	
	Male		Female		Male	Female
	Normal	Early	Normal	Early	Normal	
50	30.00%	0.00%	25.00%	0.00 %	35.00%	35.00%
55	27.00	3.00	32.00	3.00	20.00	20.00
60	19.00	8.00	22.00	6.00	100.00	100.00
65	35.00	0.00	35.00	0.00	100.00	100.00
70	40.00	0.00	50.00	0.00	100.00	100.00

### Year 2000 Plan – 2011 Tier

Age	MoDOT, Civilian Patrol and MPERS		Uniformed Patrol	
	Normal		Early	Normal
	Age & Service	Rule of 90		
55	0.00%	30.00%	0.00%	30.00%
60	0.00	30.00	0.00	100.00
65	0.00	30.00	10.00	100.00
70	100.00	100.00	0.00	100.00

## Percent of Members Becoming Disabled at the Indicated Age (Rates of Disability)

Age	MoDOT, Civilian Patrol and MPERS		Uniformed Patrol	
	Male	Female	Male	Female
25	0.04%	0.07%	0.01%	0.01%
30	0.09	0.08	0.02	0.02
35	0.13	0.13	0.02	0.02
40	0.17	0.17	0.05	0.05
45	0.23	0.36	0.09	0.09
50	0.33	0.55	0.19	0.19
55	0.62	0.74	0.35	0.35
60	1.12	0.90	0.58	0.58

# Summary of Funding and Contributions

## Schedule of Funding Progress

Year Ended June 30	Actuarial Asset Value	Accrued Liability – Entry Age	Unfunded Accrued Liability (UAAL)	Funded Ratio	Actuarial Covered Payroll <sup>(1)</sup>	UAAL as a Percentage of Covered Payroll
2008	1,783,902,280	3,019,633,781	1,235,731,501	59.08%	\$375,600,448	329.00%
2009	1,471,496,660	3,113,393,645	1,641,896,985	47.26%	379,590,273	432.54%
2010 <sup>(2)</sup>	1,375,844,573	3,258,866,925	1,883,022,352	42.22%	378,063,006	498.07%
2011	1,427,290,718	3,297,589,869	1,870,299,151	43.28%	362,654,376	515.72%
2012 <sup>(2)</sup>	1,531,033,613	3,306,278,671	1,775,245,058	46.31%	341,637,559	519.63%
2013 <sup>(2)</sup>	1,657,402,393	3,583,975,559	1,926,573,166	46.24%	329,481,506	584.73%
2014	1,795,264,291	3,650,241,741	1,854,977,450	49.18%	336,590,797	551.11%
2015	1,967,001,509	3,715,845,651	1,748,844,142	52.94%	342,264,593	510.96%
2016	2,086,654,348	3,761,733,004	1,675,078,656	55.47%	344,275,147	486.55%
2017	2,172,787,144	3,802,443,730	1,629,656,586	57.14%	356,142,973	457.58%

(1) Values are estimated from contribution rate and amount.

(2) New assumptions and/or methods adopted.

See Note 5 of Notes to the Financial Statement in the Financial Section for Funding policy information.

## Member and Employer Contribution Rates

Year Ended June 30	Employer Contributions All Benefit Structures		Member Contributions 2011 Tier All Groups
	Uniformed Patrol Group	Non-Uniformed Group	
2008	42.64%	31.04%	4.00%
2009	40.22%	30.72%	4.00%
2010	39.95%	31.40%	4.00%
2011	49.53%	39.46%	4.00%
2012	58.63%	45.45%	4.00%
2013	55.03%	50.92%	4.00%
2014	55.23%	54.25%	4.00%
2015	58.19%	58.76%	4.00%
2016	57.76%	58.05%	4.00%
2017	58.00%	58.00%	4.00%

See Required Supplementary Information, Schedule of Employers' Contributions for more information.



# Summary of Member Data Included In Valuations

	Non-Uniformed				
	Civilian Patrol	MoDOT and MPERS	Non-Uniformed Total	Uniformed Patrol	Grand Total
<b>Active Members</b>					
Closed Plan	317	1,761	2,078	565	2,643
Year 2000 Plan (also closed)	441	1,724	2,165	393	2,558
Year 2000 Plan - 2011 Tier (open)	361	1,588	1,949	306	2,255
Total Active Members	1,119	5,073	6,192	1,264	7,456
Total Active Members Prior Year	1,148	5,039	6,187	1,254	7,441
<b>Retiree - Regular Pensioners</b>					
Closed Plan	480	3,487	3,967	927	4,894
Year 2000 Plan (also closed)	548	3,229	3,777	6	3,783
Year 2000 Plan - 2011 Tier (open)	0	0	0	0	0
Total Regular Pensioners	1,028	6,716	7,744	933	8,677
Self Insured Disability Pensioners	3	47	50	3	53
Fully Insured Disability Pensioners	12	82	94	7	101
Terminated Vested Members	242	1,917	2,159	165	2,324
<b>Total</b>	<b>2,404</b>	<b>13,835</b>	<b>16,239</b>	<b>2,372</b>	<b>18,611</b>
Active Member Valuation Payroll	\$46,882,549	\$216,529,976	\$263,412,525	\$85,566,687	\$348,979,212
Active Member Valuation Payroll Prior Year	\$46,345,740	\$210,473,695	\$256,819,435	\$82,979,944	\$339,799,379
Unfunded Actuarial Accrued Liability	N/A	N/A	\$1,206,542,635	\$423,113,951	\$1,629,656,586

Member data for actuarial valuation is as of May 31, 2017

# Active Members By Attained Age and Years of Service

## MoDOT and MPERS

### Closed Plan

Attained Age	Counted by Complete Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20	-	-	-	-	-	-	-	0	\$ 0
20-24	-	-	-	-	-	-	-	0	0
25-29	-	-	-	-	-	-	-	0	0
30-34	-	-	-	-	-	-	-	0	0
35-39	-	-	1	55	1	-	-	57	2,613,394
40-44	-	-	-	139	87	-	-	226	11,343,949
45-49	-	3	3	104	257	91	2	460	23,988,990
50-54	-	3	1	82	163	191	62	502	26,327,387
55-59	-	1	1	77	122	66	87	354	18,010,522
60-64	-	-	-	36	55	25	23	139	6,806,121
65-69	-	-	-	8	4	2	8	22	1,186,838
70+	-	-	-	-	-	-	1	1	84,210
<b>Totals</b>	<b>0</b>	<b>7</b>	<b>6</b>	<b>501</b>	<b>689</b>	<b>375</b>	<b>183</b>	<b>1,761</b>	<b>\$90,361,411</b>

Average Age 50.9 years  
 Average Service 23.3 years  
 Average Pay \$51,313

### Year 2000 Plan

Attained Age	Counted by Complete Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20	-	-	-	-	-	-	-	0	\$ 0
20-24	-	-	-	-	-	-	-	0	0
25-29	3	17	2	-	-	-	-	22	770,436
30-34	9	103	96	-	-	-	-	208	8,743,092
35-39	9	70	191	69	-	-	-	339	15,139,443
40-44	8	79	128	76	1	-	-	292	12,558,954
45-49	10	68	108	56	-	-	-	242	10,084,001
50-54	7	53	111	67	-	1	-	239	9,807,566
55-59	10	56	111	65	1	1	-	244	9,672,927
60-64	4	30	66	22	1	-	1	124	4,900,543
65-69	-	2	10	1	-	-	-	13	523,439
70+	-	1	-	-	-	-	-	1	33,429
<b>Totals</b>	<b>60</b>	<b>479</b>	<b>823</b>	<b>356</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>1,724</b>	<b>\$72,233,830</b>

Average Age 45.5 years  
 Average Service 11.9 years  
 Average Pay \$41,899

Member data for actuarial valuation is as of May 31, 2017

# Active Members By Attained Age and Years of Service

## MoDOT and MPERS

Year 2000 Plan - 2011 Tier

Attained Age	Counted by Complete Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20	1	-	-	-	-	-	-	1	\$ 27,434
20-24	199	-	-	-	-	-	-	199	6,267,200
25-29	346	5	-	-	-	-	-	351	12,905,936
30-34	260	7	-	-	-	-	-	267	9,053,488
35-39	208	1	-	-	-	-	-	209	6,926,819
40-44	138	-	-	-	-	-	-	138	4,614,854
45-49	149	3	-	-	-	-	-	152	5,042,213
50-54	120	1	-	-	-	-	-	121	4,111,427
55-59	106	-	-	-	-	-	-	106	3,430,778
60-64	33	-	-	-	-	-	-	33	1,150,737
65-69	8	-	-	-	-	-	-	8	283,539
70+	3	-	-	-	-	-	-	3	120,310
<b>Totals</b>	<b>1,571</b>	<b>17</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1,588</b>	<b>\$53,934,735</b>
			<b>Average Age</b>				<b>36.7 years</b>		
			<b>Average Service</b>				<b>2.2 years</b>		
			<b>Average Pay</b>				<b>\$33,964</b>		

Member data for actuarial valuation is as of May 31, 2017.

# Active Members By Attained Age and Years of Service

## Uniformed Patrol

### Closed Plan

Attained Age	Counted by Complete Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20	-	-	-	-	-	-	-	0	\$ 0
20-24	-	-	-	-	-	-	-	0	0
25-29	-	-	-	-	-	-	-	0	0
30-34	-	-	-	-	-	-	-	0	0
35-39	-	1	-	8	-	-	-	9	697,927
40-44	-	-	-	47	49	-	-	96	7,644,575
45-49	1	-	1	27	180	26	-	235	19,132,883
50-54	-	-	-	6	63	84	16	169	14,094,979
55-59	-	-	-	1	11	18	24	54	4,572,606
60-64	-	-	-	-	1	-	1	2	170,099
65-69	-	-	-	-	-	-	-	0	0
70+	-	-	-	-	-	-	-	0	0
<b>Totals</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>89</b>	<b>304</b>	<b>128</b>	<b>41</b>	<b>565</b>	<b>\$46,313,069</b>

**Average Age** 48.5 years  
**Average Service** 23.4 years  
**Average Pay** \$81,970

### Year 2000 Plan

Attained Age	Counted by Complete Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20	-	-	-	-	-	-	-	0	\$ 0
20-24	-	-	-	-	-	-	-	0	0
25-29	1	10	-	-	-	-	-	11	614,668
30-34	1	88	34	-	-	-	-	123	7,091,591
35-39	-	28	91	14	-	-	-	133	8,681,567
40-44	-	9	50	32	-	-	-	91	6,096,109
45-49	-	4	12	9	-	-	-	25	1,613,409
50-54	-	3	3	3	-	-	-	9	586,404
55-59	-	-	-	-	1	-	-	1	78,981
60-64	-	-	-	-	-	-	-	0	0
65-69	-	-	-	-	-	-	-	0	0
70+	-	-	-	-	-	-	-	0	0
<b>Totals</b>	<b>2</b>	<b>142</b>	<b>190</b>	<b>58</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>393</b>	<b>\$24,762,729</b>

**Average Age** 37.3 years  
**Average Service** 11.6 years  
**Average Pay** \$63,009

Member data for actuarial valuation is as of May 31, 2017.



# Active Members By Attained Age and Years of Service

## Civilian Patrol

### Closed Plan

Attained Age	Counted by Complete Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20	-	-	-	-	-	-	-	0	\$ 0
20-24	-	-	-	-	-	-	-	0	0
25-29	-	-	-	-	-	-	-	0	0
30-34	-	-	-	-	-	-	-	0	0
35-39	-	-	1	6	2	-	-	9	390,108
40-44	-	1	-	18	19	-	-	38	1,852,187
45-49	-	1	2	19	30	15	-	67	3,340,371
50-54	1	-	2	20	36	23	13	95	4,571,860
55-59	-	1	-	16	20	15	20	72	3,362,143
60-64	-	-	-	5	9	5	7	26	1,284,769
65-69	-	-	-	-	5	2	2	9	404,700
70+	-	-	-	-	1	-	-	1	37,559
<b>Totals</b>	<b>1</b>	<b>3</b>	<b>5</b>	<b>84</b>	<b>122</b>	<b>60</b>	<b>42</b>	<b>317</b>	<b>\$15,243,697</b>

Average Age 51.9 years  
 Average Service 23.5 years  
 Average Pay \$48,087

### Year 2000 Plan

Attained Age	Counted by Complete Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20	-	-	-	-	-	-	-	0	\$ 0
20-24	-	-	-	-	-	-	-	0	0
25-29	4	8	-	-	-	-	-	12	478,868
30-34	-	42	17	-	-	-	-	59	2,656,547
35-39	5	29	59	13	-	-	-	106	5,139,566
40-44	3	14	21	16	-	-	-	54	2,472,886
45-49	5	13	32	13	1	-	-	64	2,678,766
50-54	-	20	26	14	-	-	-	60	2,553,871
55-59	1	15	19	13	3	-	-	51	2,166,595
60-64	1	11	6	6	-	-	-	24	847,823
65-69	-	2	2	4	-	-	-	8	318,790
70+	-	1	2	-	-	-	-	3	79,058
<b>Totals</b>	<b>19</b>	<b>155</b>	<b>184</b>	<b>79</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>441</b>	<b>\$19,392,770</b>

Average Age 44.8 years  
 Average Service 11.2 years  
 Average Pay \$43,975

Member data for actuarial valuation is as of May 31, 2017.

# Active Members By Attained Age and Years of Service

## Civilian Patrol

Year 2000 Plan - 2011 Tier

Attained Age	Counted by Complete Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30+	No.	Valuation Payroll
Under 20	-	-	-	-	-	-	-	0	\$ 0
20-24	35	-	-	-	-	-	-	35	1,057,437
25-29	75	6	-	-	-	-	-	81	2,880,778
30-34	43	17	-	-	-	-	-	60	2,253,452
35-39	27	7	-	-	-	-	-	34	1,179,722
40-44	24	5	-	-	-	-	-	29	1,008,242
45-49	38	7	-	-	-	-	-	45	1,467,284
50-54	23	5	-	-	-	-	-	28	971,348
55-59	22	2	-	-	-	-	-	24	674,638
60-64	16	4	-	-	-	-	-	20	589,298
65-69	3	2	-	-	-	-	-	5	163,883
70+	-	-	-	-	-	-	-	0	0
<b>Totals</b>	<b>306</b>	<b>55</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>361</b>	<b>\$12,246,082</b>

Average Age 38.5 years  
 Average Service 2.8 years  
 Average Pay \$33,923

Member data for actuarial valuation is as of May 31, 2017.

## Schedule of Active Member Valuation Data

Actuarial Valuation for June 30,	Number of Participating Employers	Number of Active Members	Covered Payroll	Average Pay	Percent Change in Average Pay from Prior Year
2008	3	8,599	369,424,653	42,961	2.9%
2009	3	8,784	377,652,245	42,993	0.1%
2010	3	8,457	369,911,252	43,740	1.7%
2011	3	8,231	361,639,001	43,936	0.4%
2012	3	7,458	329,293,168	44,153	0.5%
2013	3	7,319	323,205,767	44,160	0.0%
2014	3	7,390	332,085,689	44,937	1.8%
2015	3	7,358	334,400,980	45,447	1.1%
2016	3	7,441	339,799,379	45,666	0.5%
2017	3	7,456	348,979,212	46,805	2.5%
<b>Ten-Year Average</b>					<b>1.2%</b>

Member data for actuarial valuation is as of May 31, 2017.

# Solvency Test

The MPERS funding objective is to meet long term benefit promises through contributions that remain approximately level from year to year as a percent of member payroll. If the contributions to the System are level in concept and soundly executed, the System will **pay all promised benefits when due – the ultimate test of financial soundness.**

**A solvency test** is one means of checking a system's progress under its funding program. In a solvency test for a non-contributory plan, the plan's present assets (cash and investments) are compared with:

1) The liabilities for future benefits to present retired

lives and 2) The liabilities for service already rendered by members. In a system that has been following the discipline of level percent of payroll financing, the liabilities for future benefits to present retired lives (liability 1) will be fully covered by present assets (except in rare circumstances). In addition, the liabilities for service already rendered by members (liability 2) will be partially covered by the remainder of present assets. The larger the funded portion of liability 2, the stronger the condition of the system.

The schedule below illustrates the history of liability 2 of the System.

Valuation Date June 30	(1) Member Contributions	(2) Retirees and Beneficiaries	(3) Active and Inactive Members	Present Valuation Assets	Portion of Present Values Covered by Present Assets			
					(1)	(2)	(3)	Total
-----Millions-----								
2008	0	1,873	1,147	1,784	100%	95%	0%	59%
2009	0	1,947	1,166	1,471	100%	76%	0%	47%
2010*	0	2,034	1,225	1,376	100%	68%	0%	42%
2011	0	2,045	1,253	1,427	100%	70%	0%	43%
2012*	0	2,133	1,173	1,531	100%	72%	0%	46%
2013*	1	2,333	1,250	1,657	100%	71%	0%	46%
2014	2	2,384	1,264	1,795	100%	75%	0%	49%
2015	3	2,444	1,269	1,967	100%	80%	0%	53%
2016	5	2,470	1,287	2,087	100%	84%	0%	55%
2017	8	2,488	1,306	2,173	100%	87%	0%	57%

\* New assumptions and/or methods adopted.



# Derivation of Financial Experience

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 sizeable year-to-year variations from assumed experience are common. Detail on the derivation of the experience gain (loss) is shown below.

UAAL Beginning of Year (at July 1)	\$1,675,078,656
Normal Cost	49,933,711
Contributions	213,198,963
Interest	123,492,067
Net Change in LTD Assets	-
Expected UAAL Before Any Changes	1,635,305,471
Effect of Data Improvements*	(861,636)
Effect of Changes in Assumptions & Methods	-
Effect of Adjustment	-
Expected UAAL After Changes	1,634,443,835
End of Year UAAL (at June 30)	1,629,656,586
Gain/(Loss) for Year	\$4,787,249
Gain/(Loss) as a percent of actuarial accrued liabilities at start of year (\$3,715.8 million)	0.1%

\*Result of receiving disability information on retired members who are at or past normal retirement age.

Valuation Date June 30	Experience Gain (Loss) as % of Beginning Accrued Liability
2008	(0.2)%
2009	(12.6)%
2010	(3.8)%
2011	2.2%
2012	3.2%
2013	2.1%
2014	2.1%
2015	2.4%
2016	1.1%
<b>2017</b>	<b>0.1%</b>

# Schedule of Retirees and Beneficiaries Added and Removed

Valuation Date	Added to Rolls		Removed from Rolls		Rolls End of Year		Average Annual Allowances	% Increase	
	Number	Annual Allowances	Number	Annual Allowances	Number	Annual Allowances		in Annual Allowance	in Average Annual Allowance
<b>FY2017</b>									
Retirees	352	\$4,642,501	196	\$3,023,457	6,846	\$189,990,373	\$27,752	1.29%	-1.02%
Beneficiaries	127	1,536,955	134	1,099,249	1,875	\$34,257,599	18,271	3.49%	3.88%
Disabilities	24	0	24	15,898	155	\$869,833	5,576	-3.92%	-4.54%
<b>FY2016</b>									
Retirees	300	\$3,820,071	193	\$3,032,208	6,690	\$187,571,039	\$28,038	2.31%	0.68%
Beneficiaries	129	1,205,294	121	889,494	1,882	33,100,896	17,588	3.18%	2.74%
Disabilities	20	0	29	5,787	155	905,306	5,841	0.21%	6.05%
<b>FY2015</b>									
Retirees	406	\$4,669,565	188	\$2,712,395	6,583	\$183,337,549	\$27,850	2.61%	-0.79%
Beneficiaries	113	1,290,336	139	900,991	1,874	32,080,172	17,119	2.65%	4.07%
Disabilities	21	0	30	22,387	164	903,386	5,508	-3.43%	1.87%
<b>FY2014</b>									
Retirees	307	\$4,434,888	176	\$2,317,420	6,365	\$178,670,075	\$28,071	3.54%	1.41%
Beneficiaries	112	1,163,441	126	863,108	1,900	31,253,184	16,449	3.91%	4.68%
Disabilities	19	6,760	25	19,831	173	935,492	5,407	3.41%	6.40%
<b>FY2013</b>									
Retirees	395	\$5,001,943	174	\$2,761,791	6,234	\$172,564,478	\$27,681	4.56%	0.85%
Beneficiaries	130	1,349,835	96	717,434	1,914	30,077,515	15,714	6.79%	5.00%
Disabilities	27	0	23	6,788	179	904,683	5,082	-1.88%	-3.00%
<b>FY2012</b>									
Retirees	413	\$5,988,784	171	\$2,119,116	6,013	\$165,042,751	\$27,448	4.10%	-0.09%
Beneficiaries	130	1,206,259	105	610,931	1,880	28,166,374	14,966	5.20%	3.69%
Disabilities	34	0	25	16,712	175	922,027	5,239	0.39%	-5.31%
<b>FY2011</b>									
Retirees	311	\$3,955,409	146	\$2,406,006	5,771	\$158,543,113	\$27,472	0.74%	-2.14%
Beneficiaries	102	891,718	109	710,880	1,855	26,772,995	14,433	-1.17%	-0.79%
Disabilities	38	0	14	10,399	166	918,403	5,533	1.69%	-13.00%
<b>FY2010</b>									
Retirees	272	\$3,218,890	137	\$3,252,182	5,606	\$157,380,575	\$28,074	3.29%	0.80%
Beneficiaries	103	930,442	104	625,292	1,862	27,089,491	14,549	5.79%	5.85%
Disabilities	21	0	25	73,638	142	903,107	6,360	-40.95%	-39.29%
<b>FY2009</b>									
Retirees	292	\$4,125,644	178	\$2,136,578	5,471	\$152,372,034	\$27,851	4.49%	2.31%
Beneficiaries	138	1,134,755	108	622,167	1,863	25,606,266	13,745	7.80%	6.07%
Disabilities	19	0	28	71,381	146	1,529,412	10,475	-11.67%	-6.23%
<b>FY2008</b>									
Retirees	331	\$3,940,198	151	\$1,202,185	5,357	\$145,826,691	\$27,222	4.97%	1.45%
Beneficiaries	113	763,176	92	437,560	1,833	23,753,030	12,959	6.59%	5.37%
Disabilities	21	54,465	32	57,913	155	1,731,521	11,171	-22.63%	-17.14%

\*New disabilities are covered / paid by the Standard Insurance Co.  
Data of this chart is as of June 30, 2017.

# Summary of Plan Provisions \*

## Comparison of the Closed Plan, the Year 2000 Plan, and the Year 2000 Plan - 2011 Tier For the Year Ended June 30, 2017

Plan Provision	Closed Plan	Year 2000 Plan	Year 2000 Plan - 2011 Tier
<b>Membership Eligibility</b>	<ul style="list-style-type: none"> <li>Members hired prior to July 1, 2000, who became vested, and worked or continue to work in a position normally requiring at least 1,040 hours of work annually.</li> </ul>	<ul style="list-style-type: none"> <li>Members hired for the first time on or after July 1, 2000, in a position normally requiring at least 1,040 hours of work annually.</li> <li>Members who left state employment prior to becoming vested and return to work (for 12 continuous months) on or after July 1, 2000, in a position normally requiring at least 1,040 hours of work annually.</li> </ul>	<ul style="list-style-type: none"> <li>Members hired for the first time on or after January 1, 2011, in a position normally requiring at least 1,040 hours of work annually.</li> <li>Members who have never worked for a state agency covered by MPERS or MOSERS prior to January 1, 2011.</li> </ul>
<b>Normal Retirement Eligibility</b>	<ul style="list-style-type: none"> <li>Age 65 &amp; active with 4 years of service.</li> <li>Age 65 with 5 years of service.</li> <li>Age 60 with 15 years of service.</li> <li>"Rule of 80"/minimum age 48.</li> </ul> <p><u>Uniformed Members Only:</u></p> <ul style="list-style-type: none"> <li>Age 55 &amp; active with 4 years of service.</li> <li>Age 55 with 5 years of service.</li> <li>"Rule of 80"/minimum age 48.</li> <li>Mandatory retirement at age 60; no minimum service requirement (active only).</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> <p><u>Uniformed Members Only:</u></p> <ul style="list-style-type: none"> <li>"Rule of 80"/minimum age 48 (active only).</li> <li>Mandatory retirement at age 60; no minimum service requirement (active only).</li> </ul>	<ul style="list-style-type: none"> <li>Age 67 with 10 years of service.</li> <li>"Rule of 90"/minimum age 55.</li> </ul> <p><u>Uniformed Members Only:</u></p> <ul style="list-style-type: none"> <li>Age 55 &amp; active with 10 years of creditable service.</li> <li>Mandatory retirement at age 60; no minimum service requirement (active only).</li> </ul>
<b>Early (Reduced) Retirement Eligibility</b>	<ul style="list-style-type: none"> <li>Age 55 with 10 years creditable service.</li> </ul>	<ul style="list-style-type: none"> <li>Age 57 with 5 years creditable service.</li> </ul>	<ul style="list-style-type: none"> <li>Age 62 &amp; active with 10 years of creditable service. (active only)</li> </ul>
<b>Benefit</b>			
Life Benefit	1.6% x FAP** x service (base benefit is increased by 33 1/2% for uniformed patrol members only)	1.7% x FAP** x service	1.7% x FAP** x service
Temporary Benefit	Not available.	0.8% x FAP** x service Until age 62, only if retiring under "Rule of 80".	0.8% x FAP** x service Until age 62, only if retiring under "Rule of 90".
Special Benefit	<u>Uniformed Members Only:</u> \$90/mo payable until age 65, offset by any amount earned from gainful employment. (does not apply if hired on or after January 1, 1995)	<u>Uniformed Members Only:</u> Until age 62, if retiring under "Rule of 80" or at mandatory age 60.	<u>Uniformed Members Only:</u> Until age 62, if retiring under either normal retirement eligibility provision.
Death Benefit	\$5,000 benefit paid to named beneficiary <ul style="list-style-type: none"> <li>Available to retirees who retired after September 28, 1985</li> <li>Available work-related disability recipients after September 28, 1985</li> </ul>	\$5,000 benefit paid to named beneficiary <ul style="list-style-type: none"> <li>Available to retirees who retired after September 28, 1985</li> <li>Available work-related disability recipients after September 28, 1985</li> </ul>	\$5,000 benefit paid to named beneficiary <ul style="list-style-type: none"> <li>Available to retirees who retired after September 28, 1985</li> <li>Available work-related disability recipients after September 28, 1985</li> </ul>
<b>Vesting</b>	5 years of service.	5 years of service.	10 years of service.

# Summary of Plan Provisions \*

## Comparison of the Closed Plan, the Year 2000 Plan, and the Year 2000 Plan - 2011 Tier For the Year Ended June 30, 2017

Plan Provision	Closed Plan	Year 2000 Plan	Year 2000 Plan - 2011 Tier
<b>Cost-of-Living Allowance (COLA)</b>	<ul style="list-style-type: none"> <li>If hired before August 28, 1997, annual COLA is a minimum of 4%, and maximum of 5%, based on 80% of the increase in the CPI-U over the previous year, up to a maximum of 65% of original benefit.</li> <li>After 65% cap is reached, annual COLA increase will be equal to 80% of the change in the CPI-U, with a maximum of 5%.</li> <li>If hired on or after August 28, 1997, annual COLA is equal to 80% of the change in the CPI-U, with a maximum rate of 5%.</li> </ul>	<ul style="list-style-type: none"> <li>Annual COLA is equal to 80% of the change in the CPI-U with a maximum rate of 5%.</li> </ul>	<ul style="list-style-type: none"> <li>Annual COLA is equal to 80% of the change in the CPI-U with a maximum rate of 5%.</li> </ul>
<b>Survivor Benefit</b> (death before retirement) Non Duty-Related Death	<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 under age 21.</li> <li>If at least 3, but less than 5, years of service the survivor benefit is calculated using 25% of the member's base benefit calculated as if the member retired on his/her date of death.</li> </ul>	<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 under age 21.</li> </ul>	<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 under age 21.</li> </ul>
Duty-Related Death	<ul style="list-style-type: none"> <li>Survivor benefit to eligible spouse or children no less than 50% of final average pay (no minimum service requirement).</li> </ul>	<ul style="list-style-type: none"> <li>Survivor benefit to eligible spouse or children no less than 50% of final average pay (no minimum service requirement).</li> </ul>	<ul style="list-style-type: none"> <li>Survivor benefit to eligible spouse or children no less than 50% of final average pay (no minimum service requirement).</li> </ul>
<b>Optional Forms of Payment</b>	Payment options include: <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>60 or 120 guaranteed payments</li> <li>BackDROP</li> </ul>	Payment options include: <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> <li>BackDROP</li> </ul>	Payment options include: <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>
<b>Disability</b>	Long-term disability and work-related disability	Long-term disability and work-related disability	Long-term disability and work-related disability
<b>Employee Contributions</b>	Non-contributory	Non-contributory	4% of gross pay

\*This summary describes the plan provisions in Chapter 104 of the Revised Statutes of Missouri (RSMo.), as amended, that governed the programs, which MPERS administered during the period covered by this report. It does not overrule any other applicable statute or administrative rule and, in the event of a conflict, the applicable statute or rule would apply. The Year 2000 Plan was effective July 1, 2000 and the Year 2000 Plan – 2011 Tier was effective January 1, 2011. A complete summary is available at the MPERS office.

\*\*Final average pay (FAP) – average of highest 36 consecutive months of pay.

See Note 2 of Notes to the Financial Statements for more information.

# Legislative Changes

House Committee Substitute for Senate Substitute for Senate Bill 62 was signed by the Governor on July 14, 2017.

Provisions in the new law include:

1. **Terminated Vested Buyout Provision** – Allows the MPERS Board to choose to establish a buyout program for terminated-vested members of the Closed Plan and Year 2000 Plan with such program authorization expiring May 31, 2018. The Board may set rules for such program. Any terminated-vested member who participates in such program and then returns to state employment will be considered a new employee and placed in the 2011 Tier.
2. **Amendment to Pension Forfeiture Law** – Provisions clarifying pension forfeitures related to felonies committed by employees in the course of their employment.
3. **Vesting Reduction Provision** – Reduces the 10-year vesting period for 2011 Tier members to five years and provides that new terminated-vested members will:
  - a. not be eligible to receive service credit for sick leave accruals,
  - b. not be awarded a survivor benefit at the time of death but rather at the time when such member would have been eligible for normal retirement, and
  - c. have a two-year delay for the first cost-of-living increase payment rather than a one-year delay. 2011 Tier members must be actively employed on or after January 1, 2018, to be covered by this change.

# Notes

Photo courtesy of Mary Jordan

## Reaching your retirement destination

is much like the first time you dig your toes into the sand on the beach and gaze out at the ocean. There is no other feeling quite like that one. MPERS is here for one reason - to help you reach your retirement destination, no matter how you visualize your retirement.

# Statistical Summary

## **Changes in Net Position**

The chart on page 76 details a 10-year history of the additions (revenues) and deductions (expenses) of MPERS.

The chart on page 77 details a 10-year history of benefit payments by type.

## **Plan Membership**

Overall, MPERS' membership increased by 117. Retired members and their beneficiaries increased by 149, terminated-vested members decreased by 10, and active members decreased by 22.

The charts beginning on page 79 detail the number of retired members by type of benefit and the average monthly benefit payments.

Other charts and graphs in this section detail demographic information concerning our members and employers.

All non-accounting data in this section was derived from internal sources and the annual actuarial valuation reports. Member data may differ between some schedules since the valuations are performed using data as of May 31 each year.



# Changes in Net Position

## MoDOT and Patrol Employees' Retirement System Changes in Net Position, Last Ten Fiscal Years

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
<b>Additions</b>										
Employer Contributions	\$123,335,151	\$122,599,301	\$124,052,534	\$150,022,169	\$164,880,140	\$170,836,117	\$183,353,841	\$200,638,571	\$199,609,396	\$206,562,924
Employee Contributions <sup>(1)</sup>	0	0	0	45,361	202,843	503,550	1,282,379	2,086,000	2,503,824	3,238,502
Transfers from Other Systems <sup>(2)</sup>	0	0	0	17,609,276	264,954	1,727,834	1,784,382	1,114,437	2,729,679	1,752,050
Other Contributions	1,192,527	444,000	424,172	453,984	908,898	635,900	978,184	1,208,162	978,689	1,645,487
Net Investment Income	(42,915,886)	(426,265,311)	166,307,054	279,612,052	42,091,564	198,139,438	319,445,655	92,645,423	21,432,090	220,301,127
Other Income	31,546	33,571	33,145	33,141	13,760	1,650	125	148	5	614
<b>Total Additions to Fiduciary Net Position</b>	<b>81,643,338</b>	<b>(303,188,439)</b>	<b>290,816,905</b>	<b>447,775,983</b>	<b>208,362,159</b>	<b>371,844,489</b>	<b>506,844,566</b>	<b>297,692,741</b>	<b>227,253,683</b>	<b>433,500,704</b>
<b>Deductions</b>										
Benefit Payments	185,801,362	192,013,250	196,721,274	202,153,768	219,704,320	224,518,100	231,384,708	241,714,876	240,176,011	251,284,152
Administrative Expenses	2,371,215	2,339,501	2,512,181	2,658,849	2,934,969	2,997,225	3,736,355	4,066,944	4,370,860	4,515,458
<b>Total Deductions from Fiduciary Net Position</b>	<b>188,172,577</b>	<b>194,352,751</b>	<b>199,233,455</b>	<b>204,812,617</b>	<b>222,639,289</b>	<b>227,515,325</b>	<b>235,121,063</b>	<b>245,781,820</b>	<b>244,546,871</b>	<b>255,799,610</b>
<b>Change in Net Position</b>	<b>\$(106,529,239)</b>	<b>\$(497,541,190)</b>	<b>\$91,583,450</b>	<b>\$242,963,366</b>	<b>\$(14,277,130)</b>	<b>\$144,329,164</b>	<b>\$271,723,503</b>	<b>\$51,910,921</b>	<b>\$(17,293,188)</b>	<b>\$177,701,094</b>

(1) Employee contributions began January 1, 2011 for members in the Year 2000 Plan - 2011 Tier.

(2) 2011 transfer from MOSERS for Water Patrol employees.

# Benefit Payments By Type

## MoDOT and Patrol Employees' Retirement System Benefit Payments by Type, Last Ten Fiscal Years

Type of Benefit	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
<b>Age and Service Benefits:</b>										
Retiree and Survivor Annuity Payments	\$167,654,271	\$175,588,494	\$183,103,253	\$188,171,369	\$195,964,396	\$205,617,640	\$212,840,210	\$218,827,986	\$224,098,038	\$227,997,513
BackDROP Payments	14,631,932	12,859,452	10,358,181	10,792,932	18,138,891	13,426,923	13,438,730	16,366,338	10,677,166	16,887,349
<b>Disability Benefits:</b>										
Long-Term Disability	223,501	179,239	137,624	101,875	85,240	79,964	79,184	76,061	66,389	60,352
Work-Related Disability	728,507	692,043	664,469	648,320	668,821	691,227	774,541	716,047	718,009	707,953
Normal Disability	207,417	186,349	163,485	167,427	166,140	138,281	121,872	108,891	109,027	109,455
Insured Disability	1,835,734	1,847,673	1,759,262	1,696,845	1,592,517	1,512,685	1,531,578	1,554,676	1,567,825	1,620,418
<b>Death Benefits</b>	520,000	660,000	535,000	575,000	675,000	665,000	703,571	810,000	820,000	855,153
<b>Service Transfer Payments<sup>(2)</sup></b>	0	0	0	0	2,410,526	2,357,080	1,876,336	3,147,482	1,921,451	2,724,631
<b>Employee Contribution Refunds<sup>(1)</sup></b>	0	0	0	0	2,789	29,300	18,686	107,395	198,106	321,328
<b>Total Benefits</b>	<b>\$185,801,362</b>	<b>\$192,013,250</b>	<b>\$196,721,274</b>	<b>\$202,153,768</b>	<b>\$219,704,320</b>	<b>\$224,518,100</b>	<b>\$231,384,708</b>	<b>\$241,714,876</b>	<b>\$240,176,011</b>	<b>\$251,284,152</b>

(1) Employee contributions began January 1, 2011 for members in the Year 2000 Plan - 2011 Tier.

(2) Reciprocal transfer legislation enacted effective August 28, 2011.

# BUDGET TO ACTUAL REPORT

As of June 30, 2017

	<u>Annual Budget</u>	----- <b>Actual</b> ----- <u>Year End</u>	<u>% Spent</u>	<b>Budget Variance Favorable (Unfavorable)</b>
<b><u>Administrative Expenses</u></b>				
Salary/Benefits	\$1,805,980	\$1,744,880	96.6%	\$ 61,100
Professional Services	217,800	219,560	100.8%	(1,760)
Meetings/Travel/Education	37,800	15,203	40.2%	22,597
Member Education	19,450	12,764	65.6%	6,686
Office Supplies	7,000	5,070	72.4%	1,930
Printing/Postage	38,450	32,720	85.1%	5,730
Membership Dues/Subscriptions	17,982	10,716	59.6%	7,266
Utilities	41,820	36,751	87.9%	5,069
Building Expenses/Maintenance	53,420	50,751	95.0%	2,669
Rental/Lease	10,150	9,967	98.2%	183
Equipment/Furniture	7,400	11,216	151.6%	(3,816)
Information Technology	287,125	239,329	83.4%	47,796
	<hr/>	<hr/>	<hr/>	<hr/>
Administrative Sub-total	\$ 2,544,377	\$ 2,388,927	93.9%	\$ 155,450
<b><u>Investment Expenses</u></b>				
Salary/Benefits	1,571,767	1,611,957	102.6%	(40,190)
Investment Services	345,000	337,059	97.7%	7,941
Meetings/Travel/Education	59,025	61,619	104.4%	(2,594)
Direct Operating Expenses	40,000	37,166	92.9%	2,834
	<hr/>	<hr/>	<hr/>	<hr/>
Investment Sub-total	\$ 2,015,792	\$ 2,047,801	101.6%	\$ (32,009)
<b>TOTALS</b>	<b><u>\$4,560,169</u></b>	<b><u>\$4,436,728</u></b>	<b><u>97.3%</u></b>	<b><u>\$123,441</u></b>

## Reconciliation to Statement of Changes in Fiduciary Net Position,

### Administrative Expenses:

Total Administrative Expenses, page 8	\$4,515,458
Investment General Consultant	322,059
Depreciation Expense	(369,827)
OPEB expense	(35,793)
Capitalized Equipment costs	4,831
	<u>\$4,436,728</u>

# Schedule of Retired Members By Type of Benefit

## All Members\*

Amount of Monthly Benefit	Type of Benefit						Total Recipients
	Retirement		Disability			Survivor	
	Normal	Early	Normal	Work-Related	Long-Term		
1 - 200	27	100	3	24	78	91	323
201 - 400	173	201	3	0	5	167	549
401 - 600	187	170	1	0	4	162	524
601 - 800	181	106	1	0	1	190	479
801 - 1000	169	48	3	2	1	161	384
1001 - 1200	250	35	1	1	0	138	425
1201 - 1400	352	13	0	1	0	131	497
1401 - 1600	444	9	1	1	0	112	567
1601 - 1800	436	6	1	4	0	89	536
1801 - 2000	464	4	0	5	0	78	551
2001 - 2200	370	2	0	4	0	79	455
2201 - 2400	298	0	0	2	0	75	375
2401 - 2600	293	2	0	2	0	53	350
2601 - 2800	296	0	0	1	0	56	353
2801 - 3000	289	0	0	2	0	53	344
> 3000	1,918	3	0	3	0	240	2,164
<b>TOTALS</b>	<b>6,147</b>	<b>699</b>	<b>14</b>	<b>52</b>	<b>89</b>	<b>1,875</b>	<b>8,876</b>

\* This chart includes ten retirement system staff retirees

## MoDOT

Amount of Monthly Benefit	Type of Benefit						Total Recipients
	Retirement		Disability			Survivor	
	Normal	Early	Normal	Work-Related	Long-Term		
1 - 200	19	78	3	19	64	81	264
201 - 400	129	165	3	0	4	150	451
401 - 600	132	144	1	0	3	142	422
601 - 800	133	94	1	0	1	168	397
801 - 1000	115	43	3	2	1	140	304
1001 - 1200	201	28	1	1	0	123	354
1201 - 1400	297	11	0	1	0	117	426
1401 - 1600	376	9	1	1	0	89	476
1601 - 1800	361	6	1	4	0	76	448
1801 - 2000	395	4	0	5	0	68	472
2001 - 2200	315	2	0	3	0	63	383
2201 - 2400	254	0	0	1	0	55	310
2401 - 2600	247	2	0	1	0	36	286
2601 - 2800	260	0	0	1	0	32	293
2801 - 3000	244	0	0	2	0	31	277
> 3000	1,124	2	0	2	0	181	1,309
<b>TOTALS</b>	<b>4,602</b>	<b>588</b>	<b>14</b>	<b>43</b>	<b>73</b>	<b>1,552</b>	<b>6,872</b>

# Schedule of Retired Members By Type of Benefit

## Uniformed Patrol

Amount of Monthly Benefit	Type of Benefit						Total Recipients
	Retirement		Disability			Survivor	
	Normal	Early	Normal	Work-Related	Long-Term		
1 - 200	0	0	0	3	3	3	9
201 - 400	4	0	0	0	0	3	7
401 - 600	10	0	0	0	0	5	15
601 - 800	12	0	0	0	0	2	14
801 - 1000	10	0	0	0	0	9	19
1001 - 1200	5	0	0	0	0	1	6
1201 - 1400	4	0	0	0	0	4	8
1401 - 1600	2	0	0	0	0	10	12
1601 - 1800	1	0	0	0	0	6	7
1801 - 2000	2	0	0	0	0	5	7
2001 - 2200	3	0	0	1	0	12	16
2201 - 2400	1	0	0	1	0	17	19
2401 - 2600	6	0	0	0	0	14	20
2601 - 2800	2	0	0	0	0	22	24
2801 - 3000	2	0	0	0	0	21	23
> 3000	684	0	0	1	0	55	740
<b>TOTALS</b>	<b>748</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>3</b>	<b>189</b>	<b>946</b>

## Civilian Patrol

Amount of Monthly Benefit	Type of Benefit						Total Recipients
	Retirement		Disability			Survivor	
	Normal	Early	Normal	Work-Related	Long-Term		
1 - 200	7	22	0	2	11	7	49
201 - 400	40	36	0	0	1	14	91
401 - 600	45	26	0	0	1	15	87
601 - 800	36	12	0	0	0	20	68
801 - 1000	44	5	0	0	0	12	61
1001 - 1200	44	7	0	0	0	14	65
1201 - 1400	50	2	0	0	0	10	62
1401 - 1600	66	0	0	0	0	13	79
1601 - 1800	74	0	0	0	0	7	81
1801 - 2000	66	0	0	0	0	5	71
2001 - 2200	52	0	0	0	0	4	56
2201 - 2400	43	0	0	0	0	3	46
2401 - 2600	40	0	0	1	0	3	44
2601 - 2800	34	0	0	0	0	2	36
2801 - 3000	43	0	0	0	0	1	44
> 3000	104	0	0	0	0	4	108
<b>TOTALS</b>	<b>788</b>	<b>110</b>	<b>0</b>	<b>3</b>	<b>13</b>	<b>134</b>	<b>1,048</b>

# Schedule of Average Monthly Benefit Payments

## MoDOT

### By Years of Service

Retired In Fiscal Year		0 - 10	11 - 15	16 - 20	21 - 25	26 - 30	31 - 35	36 - 40	41 +
<b>2008</b>	<b>Average Benefit</b>	<b>\$294</b>	<b>547</b>	<b>1,095</b>	<b>1,513</b>	<b>2,296</b>	<b>2,635</b>	<b>2,236</b>	<b>3,597</b>
2008	Average FAP	\$2,271	2,401	2,991	3,392	3,438	3,936	3,513	4,463
<b>2008</b>	<b>Current Retirees</b>	<b>25</b>	<b>27</b>	<b>25</b>	<b>35</b>	<b>56</b>	<b>48</b>	<b>18</b>	<b>5</b>
<b>2009</b>	<b>Average Benefit</b>	<b>\$318</b>	<b>708</b>	<b>1,146</b>	<b>1,517</b>	<b>2,264</b>	<b>2,589</b>	<b>2,626</b>	<b>4,096</b>
2009	Average FAP	\$2,494	2,922	3,292	3,517	3,507	3,684	3,920	4,865
<b>2009</b>	<b>Current Retirees</b>	<b>27</b>	<b>17</b>	<b>15</b>	<b>37</b>	<b>43</b>	<b>43</b>	<b>16</b>	<b>4</b>
<b>2010</b>	<b>Average Benefit</b>	<b>\$299</b>	<b>602</b>	<b>1,261</b>	<b>1,595</b>	<b>2,455</b>	<b>2,944</b>	<b>2,915</b>	<b>3,814</b>
2010	Average FAP	\$2,319	2,524	3,235	3,508	3,674	3,944	4,015	4,008
<b>2010</b>	<b>Current Retirees</b>	<b>24</b>	<b>22</b>	<b>14</b>	<b>39</b>	<b>59</b>	<b>40</b>	<b>3</b>	<b>3</b>
<b>2011</b>	<b>Average Benefit</b>	<b>\$331</b>	<b>631</b>	<b>1,091</b>	<b>1,797</b>	<b>2,750</b>	<b>3,171</b>	<b>3,079</b>	<b>4,419</b>
2011	Average FAP	\$2,663	2,656	3,135	3,579	3,925	3,932	3,863	4,167
<b>2011</b>	<b>Current Retirees</b>	<b>21</b>	<b>34</b>	<b>23</b>	<b>42</b>	<b>64</b>	<b>35</b>	<b>6</b>	<b>3</b>
<b>2012</b>	<b>Average Benefit</b>	<b>\$414</b>	<b>538</b>	<b>1,122</b>	<b>1,680</b>	<b>2,970</b>	<b>3,302</b>	<b>2,717</b>	<b>0</b>
2012	Average FAP	\$2,945	2,769	3,434	3,495	4,231	4,272	3,777	0
<b>2012</b>	<b>Current Retirees</b>	<b>36</b>	<b>23</b>	<b>38</b>	<b>60</b>	<b>102</b>	<b>56</b>	<b>3</b>	<b>0</b>
<b>2013</b>	<b>Average Benefit</b>	<b>\$298</b>	<b>599</b>	<b>1,229</b>	<b>1,749</b>	<b>3,032</b>	<b>3,127</b>	<b>5,075</b>	<b>2,658</b>
2013	Average FAP	\$2,627	2,932	3,549	3,811	4,353	3,982	5,516	2,802
<b>2013</b>	<b>Current Retirees</b>	<b>34</b>	<b>36</b>	<b>43</b>	<b>67</b>	<b>97</b>	<b>27</b>	<b>2</b>	<b>1</b>
<b>2014</b>	<b>Average Benefit</b>	<b>\$302</b>	<b>663</b>	<b>1,141</b>	<b>1,835</b>	<b>3,105</b>	<b>3,625</b>	<b>2,697</b>	<b>0</b>
2014	Average FAP	\$2,449	3,040	3,420	3,851	4,508	4,606	3,781	0
<b>2014</b>	<b>Current Retirees</b>	<b>27</b>	<b>26</b>	<b>21</b>	<b>43</b>	<b>75</b>	<b>14</b>	<b>2</b>	<b>0</b>
<b>2015</b>	<b>Average Benefit</b>	<b>\$320</b>	<b>619</b>	<b>1,104</b>	<b>1,811</b>	<b>2,978</b>	<b>3,523</b>	<b>3,557</b>	<b>0</b>
2015	Average FAP	\$2,661	3,033	3,434	3,605	4,380	4,659	4,286	0
<b>2015</b>	<b>Current Retirees</b>	<b>52</b>	<b>60</b>	<b>39</b>	<b>50</b>	<b>77</b>	<b>19</b>	<b>2</b>	<b>0</b>
<b>2016</b>	<b>Average Benefit</b>	<b>\$331</b>	<b>484</b>	<b>814</b>	<b>1,847</b>	<b>2,863</b>	<b>3,354</b>	<b>3,804</b>	<b>0</b>
2016	Average FAP	\$2,872	2,721	2,889	3,735	4,304	4,727	5,147	0
<b>2016</b>	<b>Current Retirees</b>	<b>32</b>	<b>26</b>	<b>24</b>	<b>47</b>	<b>82</b>	<b>14</b>	<b>2</b>	<b>0</b>
<b>2017</b>	<b>Average Benefit</b>	<b>\$325</b>	<b>515</b>	<b>861</b>	<b>1,769</b>	<b>2,970</b>	<b>3,521</b>	<b>3,304</b>	<b>0</b>
2017	Average FAP	\$2,560	2,730	3,017	3,616	4,648	4,801	3,717	0
<b>2017</b>	<b>Current Retirees</b>	<b>39</b>	<b>32</b>	<b>31</b>	<b>54</b>	<b>84</b>	<b>12</b>	<b>3</b>	<b>0</b>

FAP = Final Average Pay

# Schedule of Average Monthly Benefit Payments

## Uniformed Patrol

### By Years of Service

Retired In Fiscal Year		0-10	11-15	16-20	21-25	26-30	31-35	36-40	41+
<b>2008</b>	<b>Average Benefit</b>	<b>\$613</b>	<b>0</b>	<b>2,350</b>	<b>0</b>	<b>5,439</b>	<b>5,517</b>	<b>5,936</b>	<b>0</b>
2008	Average FAP	\$1,898	0	3,969	0	6,098	5,303	5,575	0
<b>2008</b>	<b>Current Retirees</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>5</b>	<b>9</b>	<b>3</b>	<b>0</b>
<b>2009</b>	<b>Average Benefit</b>	<b>\$0</b>	<b>912</b>	<b>0</b>	<b>2,582</b>	<b>5,366</b>	<b>5,541</b>	<b>6,038</b>	<b>7,295</b>
2009	Average FAP	\$0	2,557	0	3,711	6,140	5,832	5,565	5,974
<b>2009</b>	<b>Current Retirees</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>6</b>	<b>16</b>	<b>6</b>	<b>1</b>
<b>2010</b>	<b>Average Benefit</b>	<b>\$0</b>	<b>1,111</b>	<b>1,521</b>	<b>0</b>	<b>4,959</b>	<b>6,688</b>	<b>7,208</b>	<b>0</b>
2010	Average FAP	\$0	2,749	3,072	0	5,625	6,668	7,201	0
<b>2010</b>	<b>Current Retirees</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>7</b>	<b>8</b>	<b>2</b>	<b>0</b>
<b>2011</b>	<b>Average Benefit</b>	<b>\$621</b>	<b>1,129</b>	<b>0</b>	<b>2,805</b>	<b>4,905</b>	<b>6,288</b>	<b>7,636</b>	<b>0</b>
2011	Average FAP	\$2,245	3,051	0	4,595	5,981	6,366	6,746	0
<b>2011</b>	<b>Current Retirees</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>8</b>	<b>8</b>	<b>1</b>	<b>0</b>
<b>2012</b>	<b>Average Benefit</b>	<b>\$0</b>	<b>709</b>	<b>0</b>	<b>3,136</b>	<b>4,844</b>	<b>6,153</b>	<b>0</b>	<b>0</b>
2012	Average FAP	\$0	2,463	0	4,521	6,012	6,461	0	0
<b>2012</b>	<b>Current Retirees</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>9</b>	<b>16</b>	<b>0</b>	<b>0</b>
<b>2013</b>	<b>Average Benefit</b>	<b>\$545</b>	<b>0</b>	<b>1,625</b>	<b>4,129</b>	<b>5,061</b>	<b>5,841</b>	<b>7,735</b>	<b>0</b>
2013	Average FAP	\$1,972	0	3,917	6,507	6,473	6,505	7,510	0
<b>2013</b>	<b>Current Retirees</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>9</b>	<b>8</b>	<b>1</b>	<b>0</b>
<b>2014</b>	<b>Average Benefit</b>	<b>\$458</b>	<b>0</b>	<b>0</b>	<b>3,648</b>	<b>4,967</b>	<b>6,057</b>	<b>6,881</b>	<b>0</b>
2014	Average FAP	\$2,503	0	0	6,070	6,528	6,580	6,237	0
<b>2014</b>	<b>Current Retirees</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>24</b>	<b>11</b>	<b>1</b>	<b>0</b>
<b>2015</b>	<b>Average Benefit</b>	<b>\$732</b>	<b>888</b>	<b>0</b>	<b>3,865</b>	<b>4,962</b>	<b>6,150</b>	<b>0</b>	<b>0</b>
2015	Average FAP	\$3,119	4,458	0	6,736	6,655	6,951	0	0
<b>2015</b>	<b>Current Retirees</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>20</b>	<b>10</b>	<b>0</b>	<b>0</b>
<b>2016</b>	<b>Average Benefit</b>	<b>\$283</b>	<b>978</b>	<b>0</b>	<b>3,816</b>	<b>4,586</b>	<b>5,830</b>	<b>0</b>	<b>0</b>
2016	Average FAP	\$2,599	3,804	0	6,405	6,607	7,039	0	0
<b>2016</b>	<b>Current Retirees</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>13</b>	<b>4</b>	<b>0</b>	<b>0</b>
<b>2017</b>	<b>Average Benefit</b>	<b>\$513</b>	<b>991</b>	<b>2,751</b>	<b>3,781</b>	<b>4,564</b>	<b>6,362</b>	<b>6,625</b>	<b>0</b>
2017	Average FAP	\$2,791	3,804	5,548	5,621	6,786	7,148	7,077	0
<b>2017</b>	<b>Current Retirees</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>29</b>	<b>2</b>	<b>1</b>	<b>0</b>

FAP = Final Average Pay

# Schedule of Average Monthly Benefit Payments

## Civilian Patrol

### By Years of Service

Retired In Fiscal Year		0-10	11-15	16-20	21-25	26-30	31-35	36-40	41+
<b>2008</b>	<b>Average Benefit</b>	<b>\$271</b>	<b>661</b>	<b>912</b>	<b>1,261</b>	<b>1,592</b>	<b>2,650</b>	<b>2,840</b>	<b>0</b>
2008	Average FAP	\$2,186	2,736	2,469	2,658	2,753	3,796	4,151	0
<b>2008</b>	<b>Current Retirees</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>5</b>	<b>8</b>	<b>11</b>	<b>1</b>	<b>0</b>
<b>2009</b>	<b>Average Benefit</b>	<b>\$230</b>	<b>381</b>	<b>698</b>	<b>0</b>	<b>2,475</b>	<b>2,408</b>	<b>1,869</b>	<b>2,643</b>
2009	Average FAP	\$2,090	1,874	2,135	0	3,690	3,369	2,865	2,679
<b>2009</b>	<b>Current Retirees</b>	<b>4</b>	<b>6</b>	<b>3</b>	<b>0</b>	<b>11</b>	<b>8</b>	<b>3</b>	<b>2</b>
<b>2010</b>	<b>Average Benefit</b>	<b>\$268</b>	<b>498</b>	<b>1,213</b>	<b>1,218</b>	<b>2,700</b>	<b>1,980</b>	<b>4,078</b>	<b>0</b>
2010	Average FAP	\$2,141	2,124	3,091	2,654	4,106	3,188	5,179	0
<b>2010</b>	<b>Current Retirees</b>	<b>7</b>	<b>3</b>	<b>5</b>	<b>8</b>	<b>5</b>	<b>3</b>	<b>2</b>	<b>0</b>
<b>2011</b>	<b>Average Benefit</b>	<b>\$326</b>	<b>538</b>	<b>908</b>	<b>1,776</b>	<b>2,678</b>	<b>2,996</b>	<b>0</b>	<b>0</b>
2011	Average FAP	\$2,526	2,265	2,469	3,496	4,034	3,843	0	0
<b>2011</b>	<b>Current Retirees</b>	<b>4</b>	<b>6</b>	<b>6</b>	<b>11</b>	<b>14</b>	<b>8</b>	<b>0</b>	<b>0</b>
<b>2012</b>	<b>Average Benefit</b>	<b>\$282</b>	<b>525</b>	<b>1,273</b>	<b>1,480</b>	<b>2,525</b>	<b>2,647</b>	<b>0</b>	<b>0</b>
2012	Average FAP	\$2,133	2,537	3,501	3,086	3,690	3,458	0	0
<b>2012</b>	<b>Current Retirees</b>	<b>7</b>	<b>4</b>	<b>4</b>	<b>7</b>	<b>16</b>	<b>6</b>	<b>0</b>	<b>0</b>
<b>2013</b>	<b>Average Benefit</b>	<b>\$322</b>	<b>534</b>	<b>1,029</b>	<b>1,768</b>	<b>2,426</b>	<b>2,987</b>	<b>0</b>	<b>0</b>
2013	Average FAP	\$2,723	2,551	2,888	3,498	3,359	4,003	0	0
<b>2013</b>	<b>Current Retirees</b>	<b>13</b>	<b>9</b>	<b>7</b>	<b>10</b>	<b>9</b>	<b>6</b>	<b>0</b>	<b>0</b>
<b>2014</b>	<b>Average Benefit</b>	<b>\$299</b>	<b>557</b>	<b>917</b>	<b>1,755</b>	<b>2,454</b>	<b>2,540</b>	<b>0</b>	<b>0</b>
2014	Average FAP	\$2,319	2,803	2,506	3,580	3,792	3,105	0	0
<b>2014</b>	<b>Current Retirees</b>	<b>9</b>	<b>12</b>	<b>7</b>	<b>7</b>	<b>13</b>	<b>3</b>	<b>0</b>	<b>0</b>
<b>2015</b>	<b>Average Benefit</b>	<b>\$296</b>	<b>577</b>	<b>975</b>	<b>1,778</b>	<b>2,299</b>	<b>3,461</b>	<b>0</b>	<b>0</b>
2015	Average FAP	\$2,342	2,568	2,981	3,504	3,785	4,911	0	0
<b>2015</b>	<b>Current Retirees</b>	<b>12</b>	<b>12</b>	<b>9</b>	<b>12</b>	<b>13</b>	<b>6</b>	<b>0</b>	<b>0</b>
<b>2016</b>	<b>Average Benefit</b>	<b>\$209</b>	<b>560</b>	<b>1,086</b>	<b>1,961</b>	<b>2,350</b>	<b>4,373</b>	<b>0</b>	<b>0</b>
2016	Average FAP	\$2,468	2,629	2,989	3,532	3,820	5,718	0	0
<b>2016</b>	<b>Current Retirees</b>	<b>7</b>	<b>9</b>	<b>5</b>	<b>8</b>	<b>15</b>	<b>1</b>	<b>0</b>	<b>0</b>
<b>2017</b>	<b>Average Benefit</b>	<b>\$300</b>	<b>611</b>	<b>1,214</b>	<b>1,367</b>	<b>2,628</b>	<b>2,972</b>	<b>2,715</b>	<b>0</b>
2017	Average FAP	\$2,614	2,722	3,460	3,301	4,270	4,425	3,919	0
<b>2017</b>	<b>Current Retirees</b>	<b>7</b>	<b>6</b>	<b>7</b>	<b>13</b>	<b>18</b>	<b>5</b>	<b>1</b>	<b>0</b>

FAP = Final Average Pay



# Schedule of Average Monthly Benefit Payments

## MPERS

### By Years of Service

Retired In Fiscal Year		0-10	11-15	16-20	21-25	26-30	31-35	36-40	41+
<b>2009</b>	<b>Average Benefit</b>	<b>\$0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3,065</b>	<b>0</b>	<b>9,077</b>
2009	Average FAP	\$0	0	0	0	0	5,922	0	9,989
<b>2009</b>	<b>Current Retirees</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>
<b>2012</b>	<b>Average Benefit</b>	<b>\$0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4,807</b>	<b>0</b>	<b>0</b>	<b>0</b>
2012	Average FAP	\$0	0	0	0	7,087	0	0	0
<b>2012</b>	<b>Current Retirees</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>2013</b>	<b>Average Benefit</b>	<b>\$0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>9,897</b>	<b>0</b>	<b>0</b>
2013	Average FAP	\$0	0	0	0	0	11,108	0	0
<b>2013</b>	<b>Current Retirees</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>
<b>2015</b>	<b>Average Benefit</b>	<b>\$0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4,278</b>	<b>0</b>	<b>0</b>
2015	Average FAP	\$0	0	0	0	0	4,764	0	0
<b>2015</b>	<b>Current Retirees</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>
<b>2016</b>	<b>Average Benefit</b>	<b>\$0</b>	<b>0</b>	<b>0</b>	<b>3,274</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
2016	Average FAP	\$0	0	0	9,414	0	0	0	0
<b>2016</b>	<b>Current Retirees</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

Note: There were no retirements during the years not shown above.

FAP = Final Average Pay

## Active Member Data

### Schedule of Participating Employers

	MoDOT		Patrol		MPERS		Total	
	Employees	%	Employees	%	Employees	%	Employees	%
2008	6,376	74.30	2,192	25.55	13	0.15	8,581	100
2009	6,601	74.90	2,199	24.95	13	0.15	8,813	100
2010	6,164	73.21	2,243	26.64	13	0.15	8,420	100
2011	5,796	71.03	2,350	28.80	14	0.17	8,160	100
2012	5,093	68.42	2,337	31.39	14	0.19	7,444	100
2013	4,985	67.95	2,336	31.84	15	0.21	7,336	100
2014	5,041	67.98	2,357	31.79	17	0.23	7,415	100
2015	4,993	67.72	2,364	32.06	16	0.22	7,373	100
2016	5,059	67.70	2,398	32.09	16	0.21	7,473	100
2017	5,056	67.86	2,379	31.93	16	0.21	7,451	100

Data for this chart is as of June 30, 2017.

# Active Member Data

## For the Year Ended June 30, 2017

### By Age

#### Closed Plan

Age	Total	MoDOT	Civilian Patrol	Uniformed Patrol	MPERS
< 21	0	0	0	0	0
21 - 25	0	0	0	0	0
26 - 30	0	0	0	0	0
31 - 35	0	0	0	0	0
36 - 40	152	115	16	20	1
41 - 45	476	275	47	153	1
46 - 50	799	492	75	229	3
51 - 55	689	453	99	136	1
56 - 60	381	304	52	25	0
61 - 65	106	87	19	0	0
66+	14	7	7	0	0
<b>Total</b>	<b>2,617</b>	<b>1,733</b>	<b>315</b>	<b>563</b>	<b>6</b>
<b>Average Age</b>		<b>50</b>	<b>51</b>	<b>47</b>	<b>46</b>

#### Year 2000 Plan

Age	Total	MoDOT	Civilian Patrol	Uniformed Patrol	MPERS
< 21	0	0	0	0	0
21 - 25	1	1	0	0	0
26 - 30	127	57	19	51	0
31 - 35	466	264	81	120	1
36 - 40	558	336	91	130	1
41 - 45	401	280	52	67	2
46 - 50	325	240	65	19	1
51 - 55	309	244	59	5	1
56 - 60	253	209	43	1	0
61 - 65	104	81	23	0	0
66+	11	5	6	0	0
<b>Total</b>	<b>2,555</b>	<b>1,717</b>	<b>439</b>	<b>393</b>	<b>6</b>
<b>Average Age</b>		<b>44</b>	<b>44</b>	<b>36</b>	<b>43</b>

#### Year 2000 Plan - 2011 Tier

Age	Total	MoDOT	Civilian Patrol	Uniformed Patrol	MPERS
< 21	18	16	2	0	0
21 - 25	439	298	57	84	0
26 - 30	565	337	79	148	1
31 - 35	343	247	51	44	1
36 - 40	243	194	29	20	0
41 - 45	187	143	38	5	1
46 - 50	187	142	42	3	0
51 - 55	143	119	24	0	0
56 - 60	113	85	27	0	1
61 - 65	33	17	16	0	0
66+	8	8	0	0	0
<b>Total</b>	<b>2,279</b>	<b>1,606</b>	<b>365</b>	<b>304</b>	<b>4</b>
<b>Average Age</b>		<b>35</b>	<b>37</b>	<b>28</b>	<b>40</b>

# Active Member Data

## For the Year Ended June 30, 2017

### By Years of Service

Years of Service	Closed Plan				
	Total	MoDOT	Civilian Patrol	Uniformed Patrol	MPERS
< 01	0	0	0	0	0
01 - 05	5	2	2	1	0
06 - 10	8	5	2	1	0
11 - 15	19	9	8	2	0
16 - 20	875	612	106	155	2
21 - 25	1,027	648	113	264	2
26 - 30	467	300	50	115	2
31 - 35	180	131	25	24	0
36 - 40	28	20	7	1	0
41 - 45	6	6	0	0	0
46+	2	0	2	0	0
<b>Total</b>	<b>2,617</b>	<b>1,733</b>	<b>315</b>	<b>563</b>	<b>6</b>
<b>Average Service</b>		<b>23</b>	<b>23</b>	<b>23</b>	<b>24</b>

Years of Service	Year 2000 Plan				
	Total	MoDOT	Civilian Patrol	Uniformed Patrol	MPERS
< 01	20	16	3	1	0
01 - 05	78	56	20	2	0
06 - 10	987	621	191	172	3
11 - 15	1,135	780	178	175	2
16 - 20	325	239	44	41	1
21 - 25	6	2	3	1	0
26 - 30	3	2	0	1	0
31 - 35	0	0	0	0	0
36 - 40	0	0	0	0	0
41 - 45	1	1	0	0	0
46+	0	0	0	0	0
<b>Total</b>	<b>2,555</b>	<b>1,717</b>	<b>439</b>	<b>393</b>	<b>6</b>
<b>Average Service</b>		<b>11</b>	<b>11</b>	<b>11</b>	<b>12</b>

Years of Service	Year 2000 Plan - 2011 Tier				
	Total	MoDOT	Civilian Patrol	Uniformed Patrol	MPERS
< 01	560	427	73	60	0
01 - 05	1,639	1,170	268	197	4
06 - 10	80	9	24	47	0
11 - 15	0	0	0	0	0
16 - 20	0	0	0	0	0
21 - 25	0	0	0	0	0
26 - 30	0	0	0	0	0
31 - 35	0	0	0	0	0
36 - 40	0	0	0	0	0
41 - 45	0	0	0	0	0
46+	0	0	0	0	0
<b>Total</b>	<b>2,279</b>	<b>1,606</b>	<b>365</b>	<b>304</b>	<b>4</b>
<b>Average Service</b>		<b>2</b>	<b>2</b>	<b>3</b>	<b>4</b>

# Terminated Vested Member Data

## For the Year Ended June 30, 2017

### By Age

#### Closed Plan

Age	Total	MoDOT	Civilian Patrol	Uniformed Patrol	MPERS
< 21	0	0	0	0	0
21 - 25	0	0	0	0	0
26 - 30	0	0	0	0	0
31 - 35	2	2	0	0	0
36 - 40	68	51	12	4	1
41 - 45	255	205	23	27	0
46 - 50	413	305	40	68	0
51 - 55	445	368	45	32	0
56 - 60	224	197	27	0	0
61 - 65	33	30	3	0	0
66+	0	0	0	0	0
<b>Total</b>	<b>1,440</b>	<b>1,158</b>	<b>150</b>	<b>131</b>	<b>1</b>
<b>Average Age</b>	<b>0</b>	<b>50</b>	<b>49</b>	<b>47</b>	<b>40</b>

#### Year 2000 Plan

Age	Total	MoDOT	Civilian Patrol	Uniformed Patrol	MPERS
< 21	0	0	0	0	0
21 - 25	0	0	0	0	0
26 - 30	27	22	5	0	0
31 - 35	159	126	23	10	0
36 - 40	223	189	23	11	0
41 - 45	199	172	18	9	0
46 - 50	122	111	9	2	0
51 - 55	97	86	10	1	0
56 - 60	46	43	3	0	0
61 - 65	6	6	0	0	0
66+	0	0	0	0	0
<b>Total</b>	<b>879</b>	<b>755</b>	<b>91</b>	<b>33</b>	<b>0</b>
<b>Average Age</b>	<b>0</b>	<b>42</b>	<b>40</b>	<b>38</b>	<b>0</b>

#### Year 2000 Plan - 2011 Tier

Age	Total	MoDOT	Civilian Patrol	Uniformed Patrol	MPERS
< 21	0	0	0	0	0
21 - 25	0	0	0	0	0
26 - 30	0	0	0	0	0
31 - 35	0	0	0	0	0
36 - 40	0	0	0	0	0
41 - 45	0	0	0	0	0
46 - 50	0	0	0	0	0
51 - 55	0	0	0	0	0
56 - 60	0	0	0	0	0
61 - 65	0	0	0	0	0
66+	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Average Age</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

# Terminated Vested Member Data

## For the Year Ended June 30, 2017

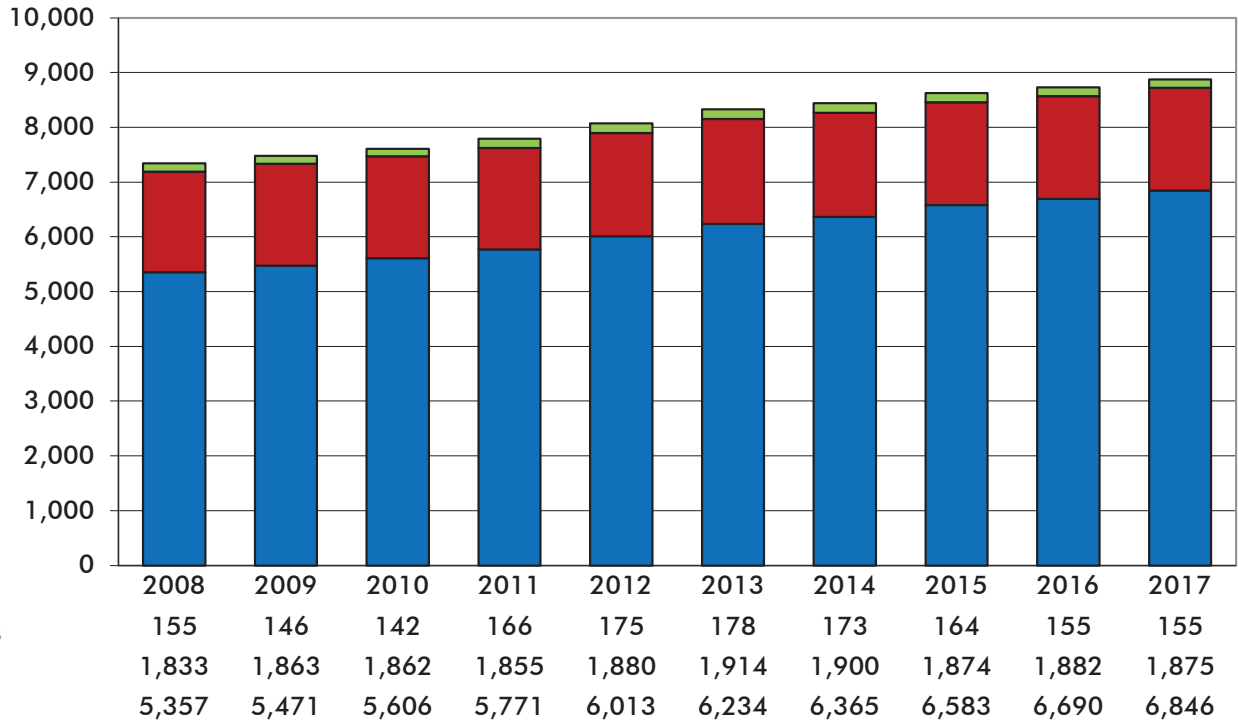
### By Years of Service

Years of Service	Closed Plan				
	Total	MoDOT	Civilian Patrol	Uniformed Patrol	MPERS
< 01	0	0	0	0	0
01 - 05	180	136	21	23	0
06 - 10	622	481	66	74	1
11 - 15	374	309	41	24	0
16 - 20	207	179	18	10	0
21 - 25	55	51	4	0	0
26 - 30	2	2	0	0	0
31 - 35	0	0	0	0	0
36 - 40	0	0	0	0	0
41 - 45	0	0	0	0	0
46+	0	0	0	0	0
<b>Total</b>	<b>1,440</b>	<b>1,158</b>	<b>150</b>	<b>131</b>	<b>1</b>
<b>Average Service</b>		<b>11</b>	<b>10</b>	<b>9</b>	<b>8</b>

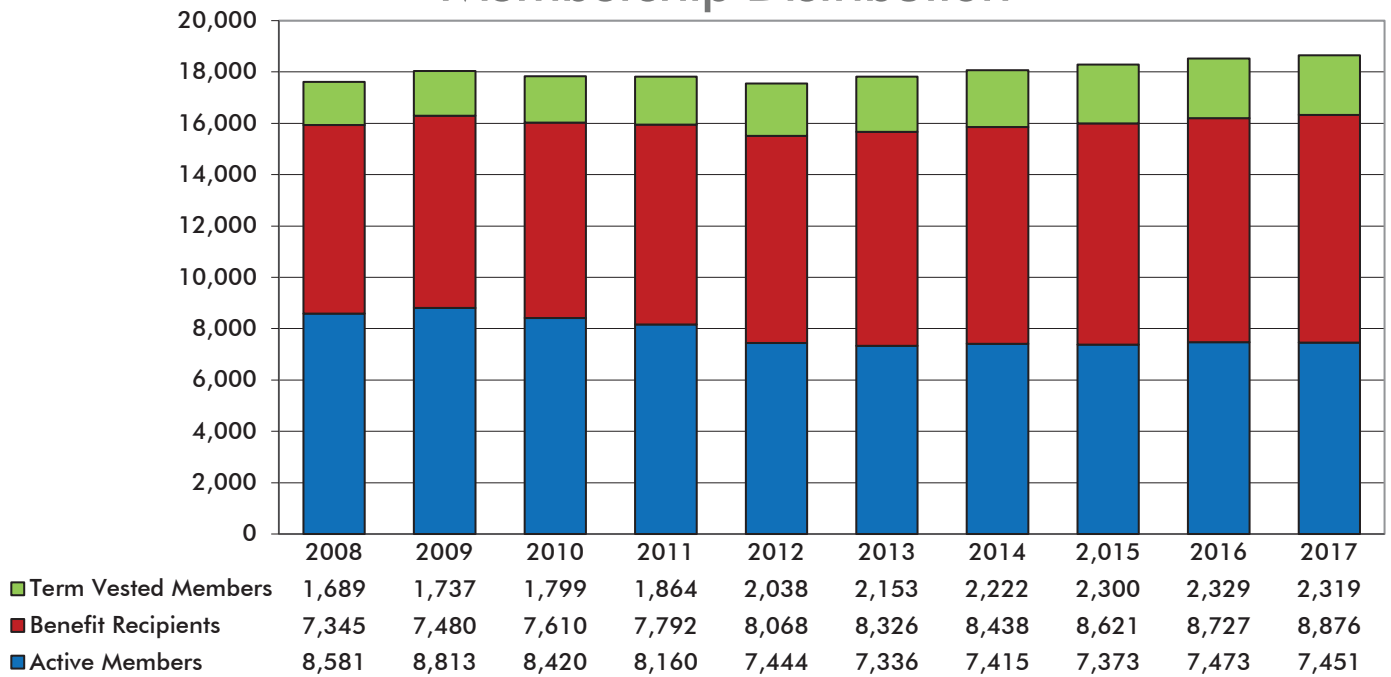
Years of Service	Year 2000 Plan				
	Total	MoDOT	Civilian Patrol	Uniformed Patrol	MPERS
< 01	0	0	0	0	0
01 - 05	163	136	23	4	0
06 - 10	571	496	52	23	0
11 - 15	140	119	16	5	0
16 - 20	5	4	0	1	0
21 - 25	0	0	0	0	0
26 - 30	0	0	0	0	0
31 - 35	0	0	0	0	0
36 - 40	0	0	0	0	0
41 - 45	0	0	0	0	0
46+	0	0	0	0	0
<b>Total</b>	<b>879</b>	<b>755</b>	<b>91</b>	<b>33</b>	<b>0</b>
<b>Average Service</b>		<b>8</b>	<b>8</b>	<b>8</b>	<b>0</b>

Years of Service	Year 2000 Plan - 2011 Tier				
	Total	MoDOT	Civilian Patrol	Uniformed Patrol	MPERS
< 01	0	0	0	0	0
01 - 05	0	0	0	0	0
06 - 10	0	0	0	0	0
11 - 15	0	0	0	0	0
16 - 20	0	0	0	0	0
21 - 25	0	0	0	0	0
26 - 30	0	0	0	0	0
31 - 35	0	0	0	0	0
36 - 40	0	0	0	0	0
41 - 45	0	0	0	0	0
46+	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Average Service</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

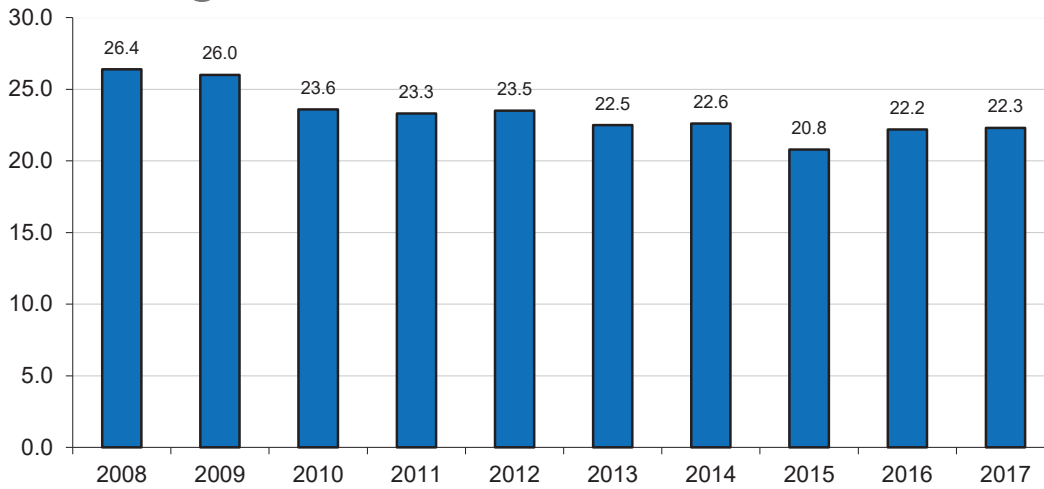
## Benefit Recipients



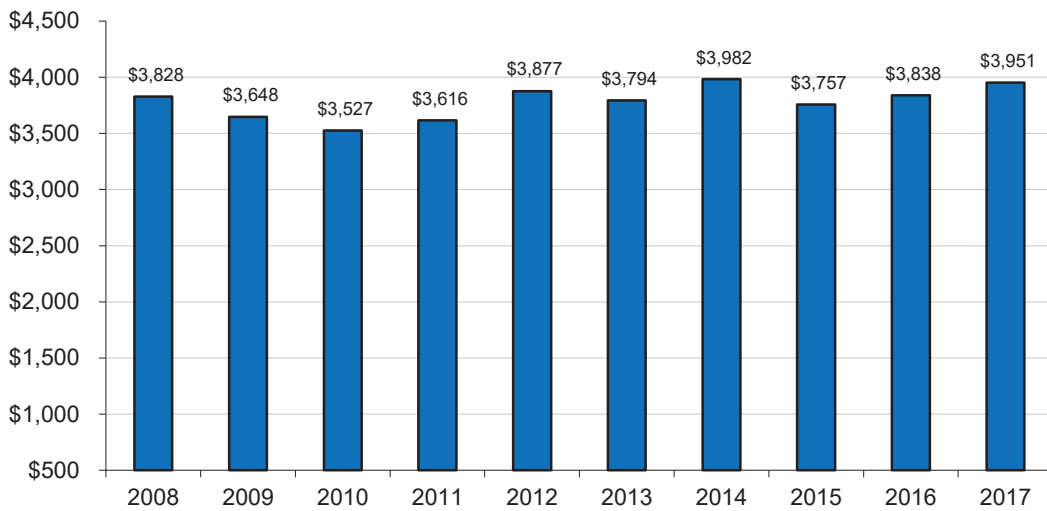
## Membership Distribution



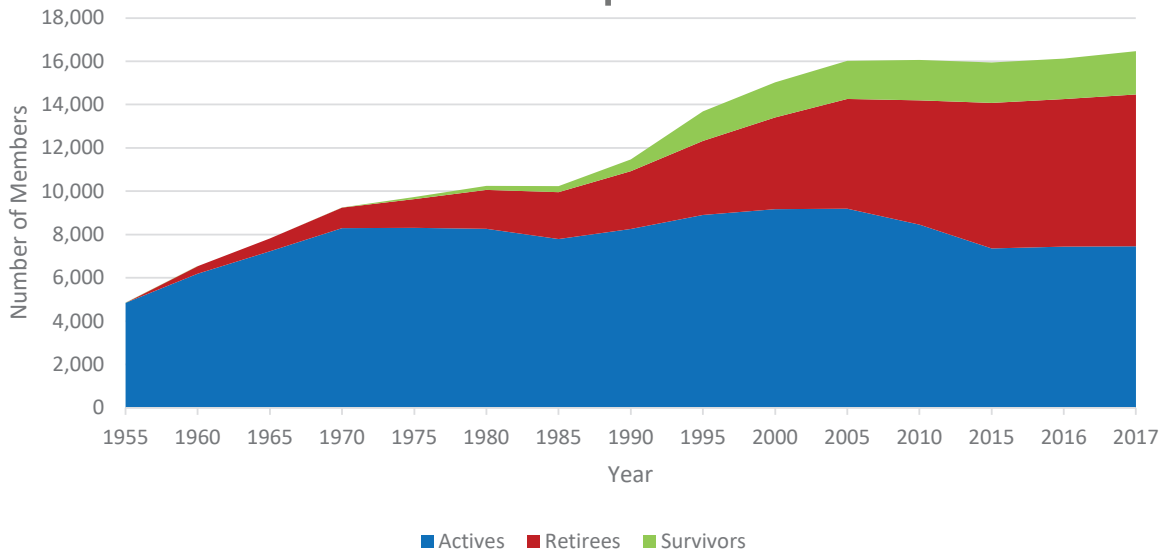
## Average Years of Service for New Retirees



## Final Average Pay for New Retirees



## MPERS Membership Over the Years



# Location of MPERS Retirees

For the Year Ended June 30, 2017

This map represents the demographic distribution of retirees by state and country.

