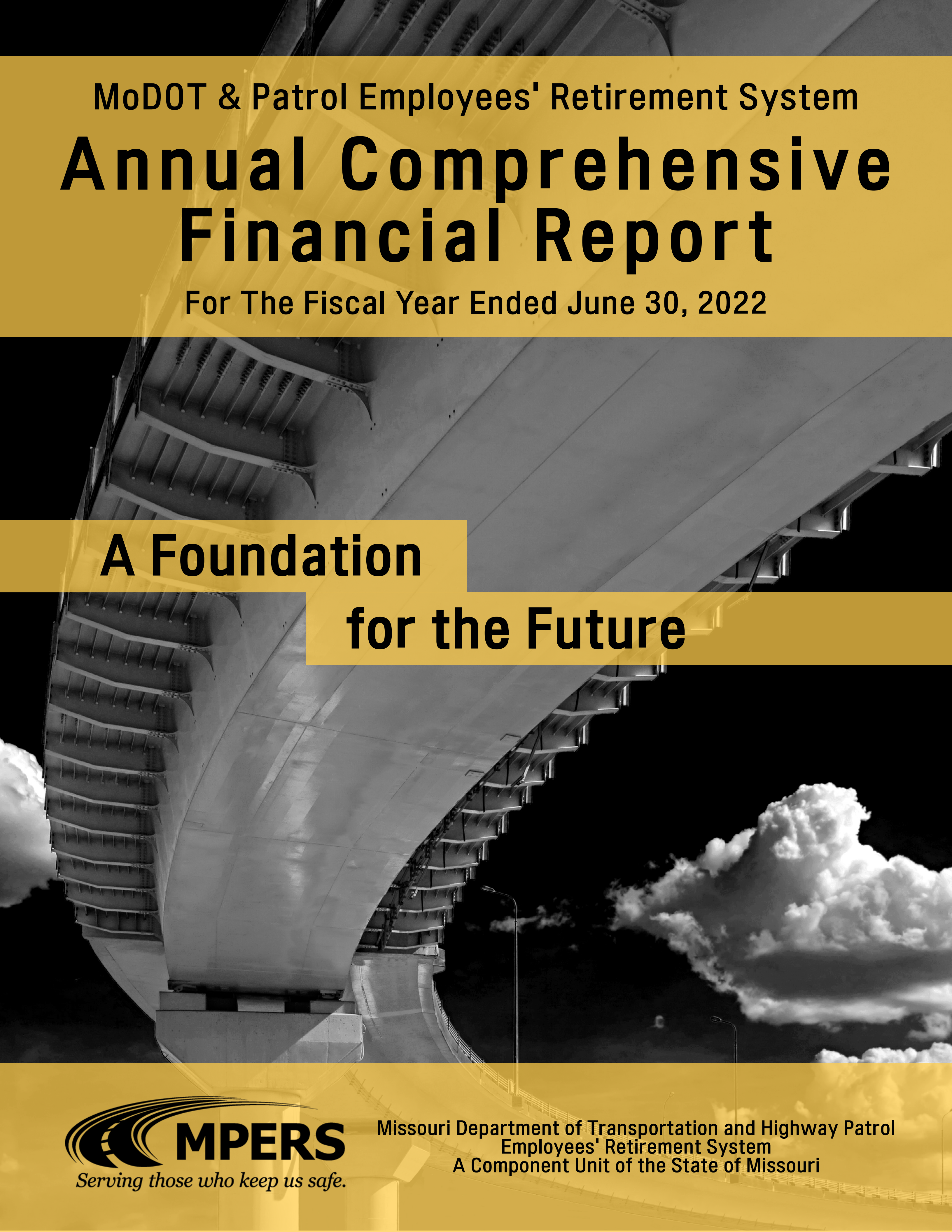
MoDOT & Patrol Employees' Retirement System

Annual Comprehensive Financial Report

For The Fiscal Year Ended June 30, 2022



A Foundation for the Future

MPERS

Serving those who keep us safe.

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

MoDOT & Patrol Employees' Retirement System
A Component Unit of the State of Missouri

Annual Comprehensive Financial Report

For The Fiscal Year Ended June 30, 2022

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Executive Director

Jennifer Even
Chief Financial Officer

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Introductory Section

November 9, 2022

To the Board of Trustees and System Members:

We are pleased to provide this *Annual Comprehensive Financial Report* (*Annual Report*), of the Missouri Department of Transportation and Highway Patrol Employees' Retirement System (MPERS), for the fiscal year ending June 30, 2022. 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 employee recruitment and retention tool for covered employers. It provides lifetime retirement benefits to eligible MoDOT and MSHP employees. The monthly retirement and survivor benefits MPERS provides are a valuable source of retirement income for the members we serve. These benefits, when combined with social security and personal savings, provide the 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 Fiscal Year 2022 retiring directly from active employment was $2,351, which equates to $28,212 per year. Given the increasing cost of living, this amount alone will not provide a comfortable life 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 $2.52 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 *Annual Report* complies with the statutory reporting requirements stipulated in sections 104.190, 104.1006, and 105.661 of the Missouri Revised Statutes (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 are 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 *Annual Report* is consistent with information displayed in the basic financial statements.

The MPERS Board of Trustees (Board) is ultimately responsible for the *Annual Report* and the basic financial statements. MPERS' executive director and staff prepare the information contained in the *Annual Report* 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 safe guarded 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 benefit derived from it.

In accordance with section 104.190 RSMo., an independent auditing firm, Williams-Keepers, LLC, has audited the financial statements included in this report and has issued an unmodified 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 *Annual Report*.

"Management's Discussion and Analysis" immediately follows the "Independent Auditors' Report" and provides a narrative introduction, overview, and analysis of the basic financial statements.

Background Information:
MPERS was established by Senate Bill 66 in the 68th General Assembly. In accordance with this legislation, employees of MoDOT and MSHP became members of the retirement system on September 1, 1955. Effective October 1, 1955, the System accepted 109 retirements. Employees of MPERS became members of the System after passage of Senate Bill 371 in 2001.

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.

MPERS' 11-member board is responsible for the oversight of the System. The trustees serve as fiduciaries 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 Annual Comprehensive Financial Report.*

Fiscal Year 2022 Highlights:
This fiscal year represented one of the more pivotal years in the System's history. This is a result of the deliberate effort applied to strategic planning. MPERS has evolved significantly over the past few decades. Much of that progress was simply "catching up" to our peers, utilizing best practices and efficiently administering statutorily based benefits. Today, MPERS has perfected those business practices and finds itself in a position where it can look forward and identify the improvements and milestones necessary to carry it into the future. We have confidently built a foundation on which we can build MPERS' future and the newly minted strategic plan is intended to propel forward the organization.

The strategic planning exercise was a collaborative process where the Board of Trustee and staff addressed a couple basic questions: 1) Where do we want to be in the next three to five years? and 2) Do we have what is needed to effectively get there and implement approved policy? Both the Board and staff were largely in sync with the answers to these basic questions. At the end of the exercise, there were several key planning issues (some explained below) that rose to the top and will be addressed in the next few years.

Cybersecurity has become one of MPERS' more significant risks, as it has for all businesses. Even though MPERS cybersecurity practices have evolved significantly over the years, the question remains whether the System's practices are sufficient to manage the risk. An extensive audit is planned to answer that question and will support changes necessary to protect the critical assets of the System and member information.

Succession planning is becoming increasingly important for MPERS. Planned personnel changes alone present a challenge to the System, especially the loss of institutional knowledge. With that challenge in mind, steps are being taken to reinforce the staffing necessary to effectively implement approved policies and to manage the transition of key personnel in the organization. Furthermore, as the organization's needs change it has become necessary to shift roles and change personnel to manage the workforce more effectively in the future and to maintain successful recruitment and retention of staff for years to come.

Stakeholder trust and confidence have never been more important. MPERS' verify-then-trust approach to reporting has proven effective, but it must be reinforced by more comprehensive review of all aspects of the organization. These comprehensive efforts, as approved by the Board of Trustees, will audit annually random areas or System processes. This will not only reinforce the organization's reported results, but it will also improve the System's processes to make them more efficient and dependable.

Lastly, MPERS' funding policy is critical to the viability of the System. Over the past two decades, the System's funding policies have been extensively reviewed and updated to aggressively address the funding shortfalls of the past. Those policies have supported material advancements to MPERS' funding levels but even as the policies have advanced the System's funding, it is time to reevaluate the funding policy to assure continued and responsible progress for the System and its covered employers. This analysis will coincide with the upcoming experience study where every aspect of MPERS' funding policy will be reviewed, potential improvements identified, and practical changes made to support continued progress for the future.

Several other important issues were identified as part of the strategic plan that will culminate in a more goal-directed future to assure key items are addressed timely and effectively. By identifying those areas where MPERS as an organization must improve, and making those part of a structured plan, MPERS can more adeptly address other necessary changes that arise along the way. Building upon the foundation this strategic plan has established will allow us to maximize stakeholder interests.

Actuarial Funding Status:
MPERS' funding objective 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 fiscal year ending June 30, 2022, MPERS' funded status, which covers 18,598 participants, increased by 3.92% to 66.33%.

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 MPERS most recent valuation dated June 30, 2022, the 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 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.

To address the System's underfunding situation, the Board has modified the actuarial funding policies over the course of the past 16 years. In September 2006, the Board adopted a permanent funding policy intended to improve MPERS' funded status over a shorter timeframe.

The permanent funding policy states the following:

- 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 polices noted in the temporary policy above. The reserve fund is funded by maintaining employer contribution rates at present levels by applying investment gains to the reserve fund rather than decreasing employer contribution rates. When actuarial losses are experienced the reserve fund is used first rather than increasing employer contribution rates. The reserve fund provides a smoothing of the overall experience that further decreases the potential volatility of contributions for covered employers.

As of June 30, 2022, the permanent funding policy has a 13- year closed amortization period and the temporary accelerated funding policy has 2-year a closed amortization period for unfunded retiree liabilities and 17 years for other unfunded liabilities.

Investment Activities:
State statutes and other applicable laws require the System's fiduciaries to make investments using the same care, skill, and diligence that prudent investors acting in a similar capacity would use. In fulfilling this obligation, the Board has established an 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 has retained investment staff, consultants, a master custodian, and other advisors.

As of June 30, 2022, MPERS' investment portfolio had a total fair value of $3.06 billion, representing a return of 3.9% for the fiscal year. Relative to MPERS' peer group, which is the InvestorForce Public Fund Universe, the 3.9% return for Fiscal Year 2022 ranked MPERS in the first percentile. The trailing three- and five-year performance of 10.6% and 9.6%, respectively, ranks MPERS in the top 1% of the peer group for both periods. The trailing 10-year performance of 9.7% ranks MPERS in the top 1% of the peer group.

Awards:
The GFOA (Government Finance Officers Association) awarded a Certificate of Achievement for Excellence in Financial Reporting to MPERS for its Fiscal Year 2021 *Annual Report*. MPERS has achieved this prestigious award every year since Fiscal Year 2005. The Certificate of Achievement is the highest form of recognition for excellence in state and local government financial reporting. To be awarded a Certificate of Achievement, a government must publish an easily readable and efficiently organized *Annual Report*. 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 *Annual Report* 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. MPERS has received the Council's award each year since 2004. This award is presented by the PPCC, a confederation of the National Association of State Retirement Administrators, the National Conference on Public Employee Retirement Systems, and the National Council on Teacher Retirement. MPERS' staff and Board is pleased to receive these prestigious awards for financial and professional standards of excellence and may be viewed after this transmittal letter.

Acknowledgements and Distribution:
This report, a product of the combined efforts of MPERS' staff and advisors, provides comprehensive and reliable information about the System, demonstrates compliance with legal provisions, and allows 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/annual-reports.

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

Colonel Eric T. Olson
Board Chair

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 Annual Comprehensive Financial Report For the Fiscal Year Ended

June 30, 2021

Christopher P. Morrill

Executive Director/CEO

Public Pension Coordinating Council

Public Pension Standards Award
For Funding and Administration
2022

Presented to

MoDOT & 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)

Alan H. Winkle
Program Administrator

MPERS is governed by an eleven-member Board of Trustees, as set out in Section 104.160 of the Missouri Revised Statues (RSMo.). Board members as of June 30, 2022:

Colonel Eric Olson
Board Chair
Superintendent of the Missouri State Highway Patrol
Ex-Officio Member

Todd Tyler
Board Vice Chair
MoDOT Employee Representative
Elected by Active MoDOT Employees

Senator Mike Bernskoetter
State Senator – District 6
Appointed by President Pro-Tem of the Senate

W. Dustin Boatwright
Commission Member
Missouri Highways and Transportation Commission

Sue Cox
MoDOT Retiree Representative
Elected by Retired MoDOT Members

Terry Ecker
Commission Member
Missouri Highways and Transportation Commission

Representative Barry Hovis
State Representative
Appointed by the Speaker of the House

Patrick McKenna
Director of MoDOT
Ex-Officio Member

Matt Morice
MSHP Employee Representative
Elected by Active MSHP Employees

William "Bill" Seibert
MSHP Retiree Representative
Elected by Retired MSHP Members

Gregg Smith
Commission Member
Missouri Highways and Transportation Commission

MPERS
Serving those who keep us safe.

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 eighteen full-time staff.

- **BOARD OF TRUSTEES**
  - Scott Simon — **Executive Director**
    - MEMBER & LEGAL SERVICES: Greta Bassett-Seymour — **Assistant Executive Director and General Counsel**
      - Barbara Graessle — **Senior Administrative Assistant**
      - Lois Wankum — **Senior Executive Assistant**
      - Mary Jordan — **Senior Benefit Specialist**
      - Bev Wilson — **Benefit Audit Specialist**
        - Angel Backes — **Senior Account Technician**
        - Tammy Kroll — **Senior Account Technician**
        - Leigh Love — **Senior Account Technician**
      - Gabrielle Lewis — **Benefit Specialist**
      - Julie West — **Communications Specialist**
    - INVESTMENTS: Larry Krummen — **Chief Investment Officer**
      - Seth Kelly — **Investment Manager**
      - Jennifer Johnson — **Investment Manager**
        - Dawn Grothoff — **Investment Officer**
        - Luke Fortson — **Investment Analyst**
    - FINANCIAL SERVICES: Jennifer Even — **Chief Financial Officer**
      - Lindsey Harris-Funk — **Assistant Chief Financial Officer**

Executive Team (left to right): Scott Simon (Executive Director), Jennifer Even (Chief Financial Officer), Larry Krummen (Chief Investment Officer), Greta Bassett-Seymour (Assistant Executive Director and General Counsel)

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 Financial Services section interacts with the investment custodian, the auditors, the depository bank, the Missouri Department of Revenue, and the Internal Revenue Service. In addition, they assist the Investments section in tracking and predicting target cash balances, participate in annual budget development, prepare monthly budget-to-actual reports, and calculate monthly premium payments to the long-term disability insurer. The Financial Services section also processes MPERS' semi-monthly office payroll, 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 benefits 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 benefits 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 in the pension administration system, (b) verifying retirement calculations, (c) balancing payroll deductions, (d) verifying SAMII 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 review member records for accuracy and completeness.

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 50 through 53 in the Investment Section for the Schedule of Investment Expenses and Brokerage Commissions for the investment professionals.

Actuary
- Gabriel, Roeder, Smith & Company

Auditor
- Williams-Keepers, LLC

Investment General Consultant
- NEPC

Information Technology
- Levi, Ray & Shoup, Inc.
- Midwest Computech, Inc.

Legislative Consultant
- Michael G. Winter Consultants, LLC

Master Trustee/Custodian
- The Northern Trust Company

Risk Management/Insurance Consultant
- Charlesworth Benefits

Long-Term Disability Insurer
- The Standard Insurance Company

Governance Consultant
- Funston Advisory Services, LLC

Investment Managers
- Aberdeen Asset Management
- ABRY Partners
- Acadian Asset Management
- Aisling Capital
- Albourne America
- Alpstone Capital
- American Infrastructure MLP
- American Timberlands Company
- Anchorage Capital Group
- Apollo Aviation Group
- Ares Management
- Arrowroot Capital
- Banner Ridge Partners
- Blackstone Alternative Asset Management
- Blackstone
- Blue Road Capital
- Bridgewater Associates
- Brooke Private Equity Advisors
- CarVal Investors (CVI)
- Carlyle Aviation Partners
- CBRE Investors
- CenterSquare Investment Management
- CIM Group
- Clarion Partners
- Corrum Capital
- DC Capital
- Drive Capital
- Dyal Capital Partners
- Energy & Mineral Group
- Fortress Investment Group
- Francisco Partners
- Golden Sciens Marine Investments Limited
- Grey Rock Energy Partners
- Grove Street Advisors
- Heartwood Partners
- Indus Capital Partners
- Kennedy Capital
- KKR
- KPS Capital Partners
- Long Ridge Equity Partners
- Longford Capital Management
- Luxor Capital Group
- M&G Investments
- Metacapital Management
- MGG Investment Group
- Millennium Management
- Miravast
- MKH
- Monomoy Capital Partners
- Natural Gas Partners
- New Mountain Capital
- NewQuest Capital Partners
- Nexus Capital Management
- Northern Shipping
- Oak Street Real Estate Group
- OCP Asia Limited
- Octagon Credit Investors
- OpenGate Capital
- Orion Mine Finance Group
- Owl Rock Capital Partners
- Parametric
- Pentwater Capital Management
- Pfingsten Partners
- PIMCO
- Principal Global Investors
- Quantum Energy Partners
- Ridgewood Energy
- Riverstone Credit Partners
- Sculptor Real Estate
- Shore Capital Partners
- Shoreline Capital
- Silchester International Investors Limited
- Silver Point Capital
- Stockdale Capital Partners
- Timberland Investment Resources
- Torchlight Investors
- Tristan Capital Partners
- Turnbridge Capital Partners
- Varde Asia

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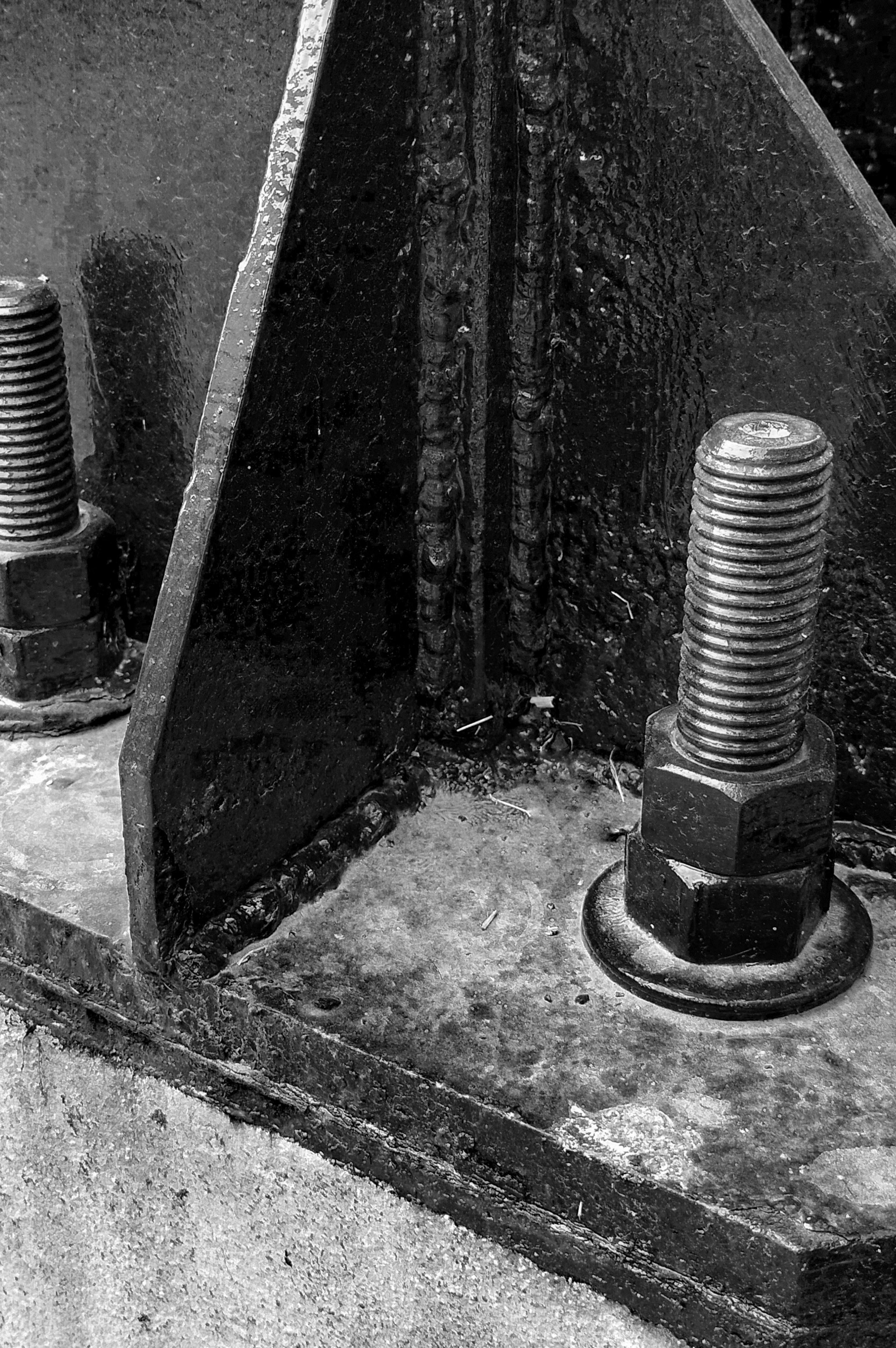

Financial Section

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INDEPENDENT AUDITORS' REPORT

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

Opinion

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, 2022, 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.

In our opinion, the financial statements referred to above present fairly, in all material respects, the fiduciary net position of the System as of June 30, 2022, and the changes in fiduciary net position for the year then ended, in conformity with U.S. generally accepted accounting principles.

Basis for Opinion

We conducted our audit in accordance with U.S. generally accepted auditing standards. Our responsibilities under those standards are further described in the Auditors' Responsibilities of the Audit of the Financial Statements section of our report. We are required to be independent of the System and to meet our ethical responsibilities, in accordance with the relevant ethical requirements relating to our audit. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a bases for our audit opinion.

Responsibilities of Management 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.

In preparing the financial statement, management is required to evaluate whether there are conditions or events, considered in the aggregate, that raise substantial doubt about the System's ability to continue as a going concern for twelve months beyond the financial statement date, including any currently known information that may raise substantial doubt shortly thereafter.

Auditors' Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditors' report that includes our opinion. Reasonable assurance is a high level of assurance but is not absolute assurance and therefore is not a guarantee that an audit conducted in accordance with generally accepted auditing standards will always detect a material misstatement when it exists. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control. Misstatements are considered material if there is a substantial likelihood that, individually or in the aggregate, they would influence the judgment made by a reasonable user based on the financial statements.

In performing an audit in accordance with generally accepted auditing standards, we:

- Exercise professional judgment and maintain professional skepticism throughout the audit.

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, and design and perform audit procedures responsive to those risks. Such procedures include examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements.

- Obtain an understanding of internal control relevant to the audit 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, no such opinion is expressed.

- Evaluate the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluate the overall presentation of the financial statements.

- Conclude whether, in our judgment, there are conditions or events, considered in the aggregate, that raise substantial doubt about the System's ability to continue as a going concern for a reasonable period of time.

We are required to communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit, significant audit findings, and certain internal control-related matters that we identified during the audit.

Required Supplementary Information

U.S. generally accepted accounting principles require that the management's discussion and analysis on pages 4 through 6 and the schedules of changes in the employers' net pension liability, employers' contributions, investment returns, changes in net OPEB liability and related ratios, MPERS' proportionate share of net OPEB liability, and related notes on pages 29 through 32 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 Systems' basic financial statements. The introductory, investment, actuarial and statistical sections as listed in the table of contents, and the schedule of administrative expenses, schedule of investment expenses, and the schedule of consultant and professional expenses on pages 33 through 35 are presented for purposes of additional analysis and are not a required part of the basic financial statements.

The schedule of administrative expenses, schedule of investment expenses, and the schedule of consultant and professional expenses on pages 33 through 35 are the responsibility of management and were derived from and relate directly to the underlying accounting and other records used to prepare the financial statements. The information on pages 33 through 35 have 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 information on pages 33 through 35 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.

Williams-Keepers LLC

Columbia, Missouri
November 8, 2022

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, 2021. 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 deferred outflows of resources, and liabilities and deferred inflows of resources, with the difference 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.

Supplementary Information follows the required supplementary information and provides additional detailed administrative and investment expense information.

ANALYSIS OF FINANCIAL POSITION AND RESULTS OF OPERATIONS

Overall, the financial position of MPERS increased by $63.3 million, reported as the "net increase". This is primarily a result of the increase in the fair value of investments for the year ended June 30, 2022. The funded status of the plan showed an increase of 3.92%, primarily due to the positive investment returns.

The following schedules present summarized comparative data from the System's financial statements for each of the fiscal years ended June 30, 2022 and 2021. Following each schedule is a brief summary providing explanation and analyses of the major reasons for changes in the condensed financial statements.

Summarized Comparative Statements of Fiduciary Net Position

	As of June 30, 2022	As of June 30, 2021	% Change 2022 / 2021
Cash and Receivables	$ 119,368,464	$ 27,488,024	334.3
Investments	3,058,469,276	3,002,537,498	1.9
Invested Securities Lending Collateral	23,800,466	117,448,756	-79.7
Capital Assets	388,915	383,217	1.5
Total Assets	**3,202,027,121**	**3,147,857,495**	**1.7**
Deferred Outflows of Resources	**513,253**	**361,851**	**41.8**
Accounts Payable	108,303,592	19,344,757	459.9
OPEB Obligation	2,367,620	2,019,603	17.2
Securities Lending Collateral	24,560,325	122,747,636	-80.0
Total Liabilities	**135,231,537**	**144,111,996**	**-6.2**
Deferred Inflows of Resources	**115,751**	**182,122**	**-36.4**
Net Position Restricted for Pensions	**$3,067,193,086**	**$3,003,925,228**	**2.1**

The increase in cash and receivables is primarily attributable to an increase of investment sales receivable as of June 30, 2022. Fluctuations in this area are normal, based on investment activity.

The System's investments represent the main component of total assets. These investments include equities, fixed income, limited partnerships, hedge funds, and short-term investments. The increase in fair value of investments as of June 30, 2022, is a result of the positive investment performance during the fiscal year. The fiscal year 2022 investment return was 3.94% as calculated on a time-weighted rate of return methodology.

Capital assets increased in fiscal year 2022 due to improvements made to a recently purchased parcel of land adjacent to the MPERS office.

Deferred outflows of resources are related to Other Post-Employment Benefits (OPEB), required by Governmental Accounting Standards Board (GASB) Statement 75. The deferred outflows of resources relate to the timing of contributions paid and changes in assumptions.

The largest component of liabilities in fiscal year 2022 is accounts payable. The increase in accounts payable for fiscal year 2022 is attributable to higher investment purchases payable. Fluctuations in this area are normal, based on investment activity. Another component of liabilities is securities lending collateral. This represents the amount owed for collateral to be returned as the result of investment securities lent. The corresponding securities lending collateral asset is valued at a lower amount than the securities lending collateral liability due to the fair value of the securities on loan being less than the collateral value.

Deferred inflows of resources are related to OPEB. The deferred inflows of resources relate primarily to the amortization of changes in actuarial assumptions.

The System's net position restricted for pensions was $3.067 billion as of June 30, 2022, a $63.3 million increase from the $3.004 billion net position as of June 30, 2021.

Summarized Comparative Statements of Changes in Fiduciary Net Position

	Year Ended June 30, 2022	Year Ended June 30, 2021	% Change 2022 / 2021
Contributions	$ 225,366,897	$ 217,389,127	3.7
Net Investment Income	122,767,485	699,644,251	-82.5
Other Income	195	286	-31.8
Total Additions	**348,134,577**	**917,033,664**	**-62.0**
Benefits	279,637,701	270,122,851	3.5
Administrative Expenses	5,229,018	4,585,473	14.0
Total Deductions	**284,866,719**	**274,708,324**	**3.7**
Net Increase	63,267,858	642,325,340	-90.2
Net Position – Beginning	3,003,925,228	2,361,599,888	27.2
Net Position – Ending	**$3,067,193,086**	**$3,003,925,228**	**2.1**

Net investment income, a primary component of plan additions, was $122.8 million for fiscal year 2022, which represented a 3.94% return for the fiscal year ended June 30, 2022. In comparison, the fiscal year 2021 income of $699.6 million represented an investment return of 30.80%. Annual fluctuations within the broad investment markets are outside the control of the System and are expected to fluctuate from year to year; however, fiscal year 2021 was an exceptional year as markets recovered from the losses incurred during the onset of the COVID-19 pandemic. Fiscal year 2022 investment returns proved just as exceptional as fiscal year 2021 given that MPERS had a positive return of 3.94% when the median public fund return was a negative 10.8%. 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 6.50%.

Total benefits increased $9.5 million from fiscal year 2021 to fiscal year 2022 due to increases in the total number of retirees, service transfer payments, and employee contribution refunds.

The increase in fiscal year 2022 administrative expenses is due to higher personnel and related benefit expenses incurred as a result of the strong investment returns and outperformance over policy benchmarks.

CURRENTLY KNOWN FACTS AND RECENT EVENTS

Based on the June 30, 2022 actuarial valuation, the Board of Trustees approved a decrease to the required state contribution rate for uniformed patrol of 58.00%, effective July 1, 2023. The rate applied to non-uniformed payroll (MoDOT, civilian patrol, and MPERS) remains at 58.00%.

Based on the June 30, 2021 actuarial valuation, the Board of Trustees approved an increase to the required state contribution rate for uniformed patrol of 58.65%, effective July 1, 2022. The rate applied to non-uniformed payroll (MoDOT, civilian patrol, and MPERS) remained at 58.00%.

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:

MoDOT and Patrol Employees' Retirement System
PO Box 1930
Jefferson City, MO 65102-1930
mpers@mpers.org

Statement of Fiduciary Net Position

As of June 30, 2022

ASSETS	
Cash	$ 1,063,596
Receivables	
Contributions	9,378,544
Accrued Interest and Income	6,888,452
Investment Sales	102,034,872
Other	3,000
Total Receivables	118,304,868
Investments, at Fair Value	
Equities	110,372,581
Fixed Income	905,805,465
Limited Partnerships	1,699,581,098
Hedge Funds	43,697,485
Short-Term Investments	299,012,647
Total Investments	3,058,469,276
Invested Securities Lending Collateral	23,800,466
Capital Assets, Net of Depreciation	
Land	188,319
Building and Improvements	581,619
Furniture, Equipment, and Software	3,438,789
Accumulated Depreciation	(3,819,812)
Capital Assets, Net of Depreciation	388,915
TOTAL ASSETS	**$3,202,027,121**
DEFERRED OUTFLOWS OF RESOURCES	**$ 513,253**
LIABILITIES	
Accounts Payable	$ 2,048,797
OPEB Obligation	2,367,620
Security Lending Collateral	24,560,325
Investment Purchases	106,254,795
TOTAL LIABILITIES	**$ 135,231,537**
DEFERRED INFLOWS OF RESOURCES	**$ 115,751**
NET POSITION RESTRICTED FOR PENSIONS	**$3,067,193,086**

See accompanying Notes to the Financial Statements.

Statement of Changes in Fiduciary Net Position

For the Year Ended June 30, 2022

ADDITIONS	
Contributions	
Employer	$ 212,711,117
Employee	5,899,734
Service Transfers from Other System	4,334,202
Other	2,421,844
Total Contributions	225,366,897
Investment Income from Investing Activities	
Net Appreciation in Fair Value of Investments	133,304,933
Interest and Dividends	58,448,600
Investment Expenses	(69,169,944)
Net Investment Gain	122,583,589
Income from Securities Lending Activities	
Securities Lending Gross Income	287,978
Securities Lending Expenses, net	(104,082)
Net Income from securities Lending Activities	183,896
Other Income	195
TOTAL ADDITIONS	**$ 348,134,577**
DEDUCTIONS	
Benefits Expenses	
Retiree and Survivor Annuity Benefits	$ 254,733,514
BackDROP Payments	17,688,088
Disability Benefits	2,303,783
Death Benefits	1,130,000
Service Transfer Payments	2,757,330
Employee Contributions Refunds	1,024,986
Total Benefits Expenses	279,637,701
Administrative Expenses	5,229,018
TOTAL DEDUCTIONS	**$ 284,866,719**
NET INCREASE	$ 63,267,858
NET POSITION RESTRICTED FOR PENSIONS	
Beginning of Year	**$3,003,925,228**
End of Year	**$3,067,193,086**

See accompanying Notes to the Financial Statements.

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. 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 $5,000. 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 MoDOT Director and MSHP Superintendent 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.

Membership in the Closed Plan, Year 2000 Plan, and 2011 Tier as of June 30, 2022

	Closed	Year 2000	Tier 2011	Total
Retirees, Beneficiaries, and Disabilities Currently				
Receiving Benefits	4,809	4,622	55	9,486
Terminated Employees Entitled to But Not Yet				
Receiving Benefits	929	1,025	302	2,256
Active Employees				
Vested	1,504	1,960	1,342	4,806
Non-Vested	3	51	1,996	2,050
Total Membership	**7,245**	**7,658**	**3,695**	**18,598**

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 on or 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 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.

Year 2000 Plan-2011 Tier Description
Employees covered by the 2011 Tier are fully vested for benefits upon earning 5 years of creditable service if they were active on or after January 1, 2018. Under the 2011 Tier, MoDOT and civilian employees may retire with full benefits upon the earliest of attaining:
- Age 67 and with 5 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 5 years of creditable service. The following provisions apply for uniformed patrol members of the 2011 Tier:
- Age 55 and with 5 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 5 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 5 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. Detailed information regarding contributions can be found in Note 5.

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:

Asset Class	Target Allocation
Public Equity	40.0%
Private Equity	10.0%
Traditional Fixed Income	22.5%
Opportunistic Debt	7.5%
Real Assets	10.0%
Real Estate	10.0%
Cash	0.0%

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 fair 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, 2022, MPERS had a carrying amount of deposits of $(202,347), and a bank balance of $190,262. 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 on June 30, 2022 totaled $1,265,943. As of June 30, 2022, 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.

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, 2022, the annual money-weighted rate of return on pension plan investments, net of pension plan investment expense, was 4.00%. 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 as of June 30, 2022

	Carrying Amount	Fair Value
Equities	$ 132,282,565	$ 110,372,581
Fixed Income	942,839,711	905,805,465
Limited partnerships	1,443,338,857	1,699,581,098
Hedge	21,078,941	43,697,485
Short Term Securities	300,304,466	300,278,590
Securities Lending Collateral	23,800,466	23,800,466
Total Investments	**$2,863,645,006**	$3,083,535,685
Reconciliation to Statement of Fiduciary Net Position:		
Less: Repurchase Agreements		(1,265,943)
Less: Securities Lending Collateral		(23,800,466)
Investments per Statement of Fiduciary Net Position		**$3,058,469,276**

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 57.00% of the total fair value of the System's investments as of June 30, 2022:

	Fair Value
Hedge Funds	$ 43,697,485
Limited Partnerships	1,699,581,098
	$1,743,278,583

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.

Investments Measured at Fair Value, June 30, 2022

Investments by Fair Value Level	**Fair Value**	**Level 1**	**Level 2**	**Level 3**
Short Term Securities	$ 287,932,946	$ 286,112,898	$ 1,820,048	$ 0
Debt Securities				
Collateralized Debt Obligations	573,715,966	0	384,558,261	189,157,705
Commercial Mortgage-Backed Securities	42,405,065	0	32,463,368	9,941,697
Corporate Bonds	8,761,463	0	8,761,463	0
Government Commercial Mortgage-Backed Securities	667,943	0	0	667,943
Government Mortgage-Backed Securities	17,059,586	0	14,697,158	2,362,428
Municipal Bonds	134,560,091	0	64,880,766	69,679,325
U.S. Government Agencies	39,876,683	0	39,876,683	0
U.S. Treasury Securities	47,318,713	0	47,318,713	0
Funds – Corporate Bonds	14,244,830	14,244,830	0	0
Total Debt Securities	878,610,340	14,244,830	592,556,412	271,809,098
Equity Securities				
Financials	46,571,123	43,452,953	3,118,170	0
Information Technology	326	326	0	0
Real Estate	40,227,145	40,227,145	0	0
Total Equity Securities	86,798,594	83,680,424	3,118,170	0
Private Markets				
Opportunistic Debt	337,238,784	33,094,554	5,951,289	298,192,941
Private Equity	493,791,854	501,979	0	493,289,875
Real Assets	442,501,053	(801,386)	0	443,302,439
Real Estate	200,032,983	8,562,350	0	191,470,633
Total Private Markets	1,473,564,674	41,357,497	5,951,289	1,426,255,888
Investment Derivative Instruments				
Futures – Swaps	(21,407,894)	0	(21,407,894)	0
Total Investment Derivative Instruments	(21,407,894)	0	(21,407,894)	0
Total Investment by Fair Value Level	$2,705,498,660	**$ 425,395,649**	**$ 582,038,025**	**$ 1,698,064,986**
Investments Measured at Net Asset Value				
Equity Long/Short	1			
Event	4,594,932			
Global Asset Allocation	9,288,906			
In-Liquidation	914,007			
Multi-Strategy	267,890,289			
Private Real Estate Fund	72,962,730			
Structured Credit - Relative Value	11,706			
Total Investments Measured at Net Asset Value	355,662,571			
Total Investments	**$3,061,161,231**			
Reconciliation to Statement of Fiduciary Net Position				
Total Investments Measured at Fair Value and Derivatives	$3,061,161,231			
Investment Sales Receivable	(102,034,872)			
Investment Purchases Payable	106,254,795			
Accrued Interest and Income	(6,888,452)			
Accrued Expenses	(23,426)			
Total Investments per Statement of Fiduciary Net Position	**$3,058,469,276**			

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. 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.

Private Markets Measured at Fair Value as of June 30, 2022

Private Markets	Fair Value	Unfunded Commitments
Private Equity	$ 493,791,854	$ 162,783,851
Real Estate	200,032,983	164,719,981
Real Assets	442,501,053	83,979,170
Opportunistic Debt	337,238,784	190,021,292
Total Private Markets	**$ 1,473,564,674**	**$ 601,504,294**

<u>**Private Markets**</u>
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 29 direct fund investments and three fund of fund investments. These funds mostly 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 and growth equity 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 30 real estate funds. The noncore real estate book includes 25 real estate funds that invest 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 five investments are in core real estate funds. Four of these funds are open-ended. Four are eligible for redemption on a quarterly basis and one on a daily basis.

Real Assets: The real asset portfolio contains 35 funds that invest in private energy, aviation, 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 12 direct timber investments. 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 36 funds, provide financing to various 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.

Investments Measured at Net Asset Value as of June 30, 2022

Investments at Net Asset Value	Net Asset Value	Unfunded Commitments	Redemption Frequency (If Currently Eligible)	Redemption Notice Period
Hedge Funds				
Equity Long/Short	$ 1	$ 0	Quarterly	45 days
Event Driven	4,594,932	0	Monthly	90 days
Global Asset Allocation	9,288,906	0	Monthly	5-60 days
In-Liquidation	914,007	0	In Liquidation	
Multi-Strategy	267,890,289	0	Monthly	60-90 days
Structured Credit – Relative Value	11,706	0	Quarterly	60 days
Total Hedge Funds	282,699,841	0		
Private Real Estate Funds	72,962,730	0	Daily	90 days
Total Investments at Net Asset Value	**$355,662,571**	**$ 0**		

Hedge Funds

Equity Long/Short: Consisting of one fund, this strategy invests in both long and short in Asia Pacific 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 months.

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 this fund 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 develop systematic rules for trading positions. Due to contractual lock-up restrictions, the value of this fund is eligible for redemption in the next 35 days.

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

Multi-Strategy: The two 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 months.

Structured Credit – Relative Value: MPERS currently has one fund that is in liquidation in this strategy.

Private Real Estate Funds

MPERS invests in five core private real estate funds that are commingled in nature. Four are eligible for redemption on a quarterly basis and one on a daily basis.

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, 2022

		Investment Maturities (in years)			
Investment Type	**Fair Value**	**Less than 1**	**1 – 5**	**6 – 10**	**More than 10**
Asset-Backed Securities	$579,701,180	$ 62,874,457	$ 37,143,255	$156,513,168	$323,170,300
Commercial Mortgage-Backed Securities	36,061,674	0	0	3,499,152	32,562,522
Corporate Bonds	8,668,538	0	3,565,604	185,319	4,917,615
Government Agencies	39,495,438	0	0	1,772,848	37,722,590
Government Bonds	25,898,516	0	0	0	25,898,516
Government Mortgage-Backed Securities	17,005,243	2,115	83,556	230,104	16,689,468
Government-Issued Commercial Mortgage-Backed Securities	642,686	0	0	0	642,686
Index Linked Government Bonds	21,076,516	0	0	8,789,002	12,287,514
Municipal/Provincial Bonds	155,769,466	945,501	10,440,330	27,810,785	116,572,850
Non-Government-Backed C.M.O.’s	7,241,378	0	589,331	0	6,652,047
Short Term Bills and Notes	1,820,048	1,820,048	0	0	0
Total	**$893,380,683**	**$ 65,642,121**	**$ 51,822,076**	**$198,800,378**	**$577,116,108**

NOTE 3(h) – Investment Credit Ratings

The table below summarizes the credit ratings of the government obligations, corporate bonds, mortgages, and asset-backed securities.

Investment Type	AAA	AA	A	BBB	BB	B	CCC	CC	Not Rated	US Government Guaranteed	Total
Asset-Backed Securities	$194,277,963	$ 74,079,786	$ 10,540,501	$ 0	$ 918,714	$ 93,506,794	$ 0	$ 6,427,832	$199,949,590	$ 0	$ 36,061,674
Commercial Mortgage-Backed Securities	9,181,349	1,614,799	0	0	0	0	0	0	25,258,536	6,990	36,061,674
Corporate Bonds	0	4,917,615	2,001,120	1,749,803	0	0	0	0	0	0	8,668,538
Government Agencies	0	36,631,566	0	0	0	0	0	0	0	2,863,872	39,495,438
Government Bonds	0	0	0	0	0	0	0	0	4,702,813	21,195,703	25,898,516
Government Mortgage-Backed Securities	0	0	0	0	0	0	0	0	46,641	16,958,602	17,005,243
Government-Issued Commercial Mortgage-Backed Securities	0	0	0	0	0	0	0	0	0	642,686	642,686
Index Linked Government Bonds	0	0	0	0	0	0	0	0	8,789,002	12,287,514	21,076,516
Municipal/Provincial Bonds	27,345,600	89,786,988	0	0	0	0	0	0	38,636,878	0	155,769,466
Non-Government-Backed C.M.O.'s	2,278,801	0	0	133,175	0	0	1,883,537	0	2,945,865	0	7,241,378
Short Term Bills and Notes	0	0	0	0	0	0	0	0	1,820,048	0	1,820,048
Total	**$233,083,713**	**$207,030,754**	**$ 12,541,621**	**$ 1,882,978**	**$ 918,714**	**$ 93,506,794**	**$ 1,883,537**	**$ 6,427,832**	**$282,149,373**	**$ 53,955,367**	**$893,380,683**

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, 2022

Foreign Currency	Equities	Fixed Income	Real Estate / Partnerships	Cash and Cash Equivalents	Total
Australian Dollar	$ 397,186	$ 0	$ 0	$ 0	$ 397,186
British Pound Sterling	291,980	1,257,602	244,275	67,491	1,861,348
Canadian Dollar	319,433	0	0	(193,069)	126,364
Euro	671,096	931,742	41,025,244	120,692	42,748,774
Hong Kong Dollar	499,018	0	0	0	499,018
New Israeli Shekel	0	0	0	1,820,048	1,820,048
Japanese Yen	851,609	0	0	0	851,609
Singapore Dollar	315,282	0	0	0	315,282
Total Exposure Risk	**$ 3,345,604**	**$ 2,189,344**	**$41,269,519**	**$ 1,815,162**	**$48,619,629**

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, 2022, 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 57 days as of June 30, 2022. Cash open collateral is invested in a short-term investment pool, which had an interest sensitivity of 24 days as of June 30, 2022. 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 following table summarizes the collateral held (including both cash collateral recognized in the Statement of Fiduciary Net Position and non-cash collateral).

Collateral Held as of June 30, 2022

Investment Type	
Equities	$41,698,182
Corporate Fixed	586,387
Government & Government-Sponsored Securities	637,020
Agencies	1,433,329
Total	**$44,354,918**

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, swaps contracts, options contracts, and forward foreign currency exchange contracts. MPERS enters into 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 $887,560,000 for the various contracts in MPERS' portfolio as of June 30, 2022, is recorded in investments on the Statement of Fiduciary Net Position. The change in fair value of $(159,219,477) for the year ended June 30, 2022, is recorded in investment income on the Statement of Changes in Fiduciary Net Position.

Investment Derivatives as of June 30, 2022

Type	Classification	Notional / Fair Value	Unrealized Gain / (Loss)
Foreign Currency Forward Contracts	Investments, at fair value	$ 6,177,885	$ 40,186
Futures Contracts	Investments, at fair value	643,536,117	(103,815,932)
Swaps Contracts	Investments, at fair value	237,845,998	(55,443,701)
Total		**$887,560,000**	**$(159,219,447)**

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 contract. The associated counterparty's credit rating is an A+.

NOTE 4 – RECEIVABLES

Receivables as of June 30, 2022

Type	Total
Contributions – MoDOT	$ 5,660,739
Contributions – MSHP Non-Uniformed	1,295,582
Contributions – MSHP Uniformed	2,169,068
Contributions – MPERS	253,155
Investment Interest & Income	6,888,452
Investment Sales	102,034,872
Miscellaneous	3,000
Total	**$118,304,868**

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 $212,711,117 for fiscal year 2022, represent funding of normal costs and amortization of the unfunded accrued liability. Actual contributions made were 100% of required contributions. Contribution rates as of June 30, 2022, as determined by the actuarial valuation for the year ended June 30, 2020, are shown in the following table. The Board established actual rates to be the same as the actuarially determined rates.

Contribution Rates

MoDOT, MPERS & Civilian Patrol	Uniformed Patrol	2011 Tier Employee
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, 2022, was $170,663,656.

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 as of June 30, 2022, were as follows:

Total pension liability	$ 4,410,685,047
Plan fiduciary net position	(3,067,193,086)
Employers' net pension liability	$ 1,343,491,961
Plan fiduciary net position as a percentage of the total pension liability	69.54%
Covered payroll	$ 367,493,332
Employers' net pension liability as a percentage of covered payroll	365,58%

Actuarial Assumptions

The total pension liability amounts were determined by actuarial valuations as of June 30, 2022, using the following actuarial assumptions, applied to all prior periods included in the measurement:

Inflation (price inflation)	2.25%
Salary Increases (includes 3.00% wage inflation)	3.00% to 12.45%
Investment Rate of Return	6.50%

The mortality tables, for post-retirement mortality, used in evaluating allowances to be paid to non-disabled pensioners were the RP-2014 Healthy Mortality Tables projected to 2022 using projection scale MP-2017. Pre-retirement mortality used were the RP-2014 Employee Mortality Table projected to 2022 using projection scale MP- 2017 and multiplied by a factor of 65%. Disabled pension mortality was based on RP-2014 Disabled Retiree Annuitant Mortality Tables projected to 2022 using projection scale MP-2017.

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 of June 30, 2022, (see Note 3) are summarized in the following table:

Asset Class	Long-Term Expected Rate of Return
Global Equity	3.4%
Private Equity	7.4%
Fixed Income	1.4%
Opportunistic Debt	5.6%
Real Assets	3.7%
Real Estate	2.0%

Discount Rate

A single discount rate of 6.50% 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 6.50%. 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, 2022, net pension liability, calculated using a single discount rate of 6.50%, 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	
	1% Decrease 5.50%	**Rate Assumption 6.50%**	**1% Increase 7.50%**
Net Pension Liability	$1,868,572,532	$1,343,491,961	$906,377,429

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 – PERSONNEL SERVICES AND RETIREMENT PLAN

MPERS employed 18 full-time employees as of June 30, 2022. Eleven 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 fiscal year 2022, amounting to $1,374,954. The amounts for fiscal year 2022 and the four 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**
2018	58.00%	$1,127,506
2019	58.00	987,370
2020	58.00	987,743
2021	58.00	1,219,468
2022	58.00	1,374,954

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 and is administered by MoDOT. The Insurance Plan is financed on a pay-as-you-go basis and is an internal service fund of MoDOT. As of June 30, 2022, there were 9 inactive (retired) members and 18 active employees participating in the Insurance Plan.

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, Financial Services 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.

Changes in Total OPEB Liability

MPERS' proportionate share (0.17%) of the Insurance Plan's net OPEB liability is $2,367,620 which was measured as of July 1, 2021, and the total OPEB liability used to calculate the net OPEB liability was determined by an actuarial valuation as of that date**.**

Summary of Changes in Net OPEB Liability for the Year Ended June 30, 2022

	Total
Beginning Balance	$2,019,603
Changes for the year:	
Service Cost	74,581
Interest Cost	45,896
Changes of benefit terms	0
Differences between expected and actual experience	263,007
Changes in assumptions	(368)
Benefit Payments	(35,099)
Net Changes	348,017
Ending Balance	**$2,367,620**

Deferred Outflows and Inflows

For the year ended June 30, 2022, MPERS recognized net OPEB expense of $162,736 MPERS reported deferred outflows of resources and deferred inflows of resources related to OPEB from the following sources:

Deferred Outflows of Resources and Deferred Inflows of Resources Related to OPEB

	Deferred Outflows	**Deferred Inflows**
Differences between expected and actual experience	$218,809	$ 13,318
Changes of assumptions or other inputs	264,777	102,433
Contributions subsequent to measurement date	29,667	0
Total	**$513,253**	**$115,751**

Deferred outflows resulting from contributions subsequent to the measurement date will be recognized as a change to the net pension liability in each subsequent year. Other deferred amounts related to OPEB will be recognized in expenses as follows:

Deferred Outflows of Resources and Deferred Inflows of Resources Related to OPEB

Fiscal Year	
2023	$ 71,926
2024	76,500
2025	94,348
2026	107,192
2027	47,536
Total Thereafter	0
	$ 397,502

Actuarial Assumptions

The following actuarial assumptions and other inputs, applied to all periods included in the measurement:

Cost method	Entry Age Normal based upon salary
Salary increases	2.50%
Discount rate	2.16%
Investment rate of return	N/A; the plan is unfunded
Health care cost trend rates	5.90%; decreasing to 4.65% in 2027
Retirees' share of benefit-related costs	43.03% - 60.02%
Admin Expense Trend (Inflation) Rate	3.00%

- The salary increases were based on projected salaries, which include COLAs, provided by MoDOT.
- The discount rate was based on Bond Buyer General Obligation 20-Bond Municipal Bond Index.
- Mortality rates were based on Pub-2010 Public Retirement Plans Safety Employees Mortality Table weighted by Headcount projected by MP-2021.
- The actuarial assumptions used in the June 30, 2022 valuation were based on the results of an actuarial experience study for the period July 1, 2020-June 30, 2021.
- It is assumed the current employer and member contributions will continue as approved by the Commission.

Changes of assumptions and other inputs reflect a change in the discount rate from 2.21% in 2021 to 2.16% in 2022.

The following table illustrates the impact of interest rate sensitivity on the Net OPEB Liability as of June 30, 2022:

Interest Rate Sensitivity

	1% Decrease	Current Discount Rate	1% Increase
Net OPEB Liability	$2,873,948	$2,367,620	$1,975,843

The following table illustrates the impact of healthcare cost trend sensitivity on the Net OPEB Liability as of June 30, 2022:

Healthcare Cost Trend Sensitivity

	1% Decrease	Current Discount Rate	1% Increase
Net OPEB Liability	$1,937,227	$2,367,620	$2,931,720

NOTE 11 – CAPITAL ASSETS

Summary of Changes in Capital Assets

	June 30, 2021 Balance	Additions	Deletions / Retirements	June 30, 2022 Balance
Land	$ 159,293	$ 29,026	$ 0	$ 188,319
Building	581,619	0	0	581,619
Furniture, Equipment and Software	3,438,789	0	0	3,438,789
Less: Accumulated Depreciation	(3,796,484)	(23,328)	0	(3,819,812)
Total	**$ 383,217**	**$ 5,698**	**$ 0**	**$ 388,915**

NOTE 12 – COMMITMENTS

MPERS has committed $1,775,534,146 of which $1,174,029,852 has been invested, leaving total unfunded commitments to private equity, real estate, real assets, and opportunistic debt of $601,504,294 as of June 30, 2022. The total unfunded investment commitments are not recorded in the accompanying Statement of Fiduciary Net Position.

NOTE 13 – 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 liability 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 computing operations.

Schedule of Changes in the Employers' Net Pension Liability
Year Ended June 30

	2022	2021	2020	2019	2018
Total Pension Liability					
Service Cost (1)	$ 55,097,433	$ 43,726,886	$ 44,048,083	$ 43,971,030	$ 46,621,377
Interest on the Total Pension Liability	275,067,181	278,522,994	274,791,358	271,174,089	286,457,436
Benefit Changes	0	0	0	0	(7,684)
Difference Between Expected and Actual Experience	16,085,222	(26,471,689)	3,494,582	203,459	(37,173,164)
Assumption Change	0	226,319,675	0	0	142,556,109
Benefit Payments (2)	(278,612,715)	(266,108,191)	(262,710,811)	(255,310,406)	(254,131,209)
Refunds	(1,024,986)	(611,132)	(796,107)	(780,538)	(503,007)
Disability Premiums (2)	0	(1,600,628)	(1,640,971)	(1,615,860)	(1,601,605)
Transfers to Other Retirement Systems (2)	0	(1,802,900)	(2,457,945)	(2,111,007)	(2,823,042)
Net Change in Total Pension Liability	**66,612,135**	**251,975,015**	**54,728,189**	**55,530,767**	**179,395,211**
Total Pension Liability – Beginning	**4,344,072,912**	**4,092,097,897**	**4,037,369,708**	**3,981,838,941**	**3,802,443,730**
Total Pension Liability – Ending (a)	**$4,410,685,047**	**$4,344,072,912**	**$4,092,097,897**	**$4,037,369,708**	**$3,981,838,941**
Plan Fiduciary Net Position					
Contributions – Employer	$ 212,711,117	$ 208,212,848	$ 210,871,852	$ 210,166,927	$ 204,955,180
Contributions – Employee (3)	12,655,780	7,095,963	6,547,351	5,996,344	5,001,418
Pension Plan Net Investment Income	122,767,680	699,644,536	(10,667,857)	154,326,818	197,619,838
Benefit Payments (2)	(278,612,715)	(266,108,191)	(262,710,811)	(255,310,406)	(254,131,209)
Refunds	(1,024,986)	(611,132)	(796,107)	(780,538)	(503,007)
Disability Premiums (2)	0	(1,600,628)	(1,640,971)	(1,615,860)	(1,601,605)
Pension Plan Administrative Expense	(5,229,018)	(4,585,473)	(4,291,028)	(4,372,966)	(4,693,492)
Net Transfers (1) (2)	0	277,417	1,025,629	321,363	(955,597)
Net Change in Plan Fiduciary Net Position	**63,267,858**	**642,325,340**	**(61,661,942)**	**108,731,682**	**145,691,526**
Plan Fiduciary Net Position – Beginning	**3,003,925,228**	**2,361,599,888**	**2,423,261,830**	**2,314,530,148**	**2,168,838,622**
Plan Fiduciary Net Position – Ending (b)	**$3,067,193,086**	**$3,003,925,228**	**$2,361,599,888**	**$2,423,261,830**	**$2,314,530,148**
Adjustment – GASB 75 Implementation					
Plan Fiduciary Net Position – Ending (as restated)					
Employers' Net Pension Liability (a) – (b)	**$1,343,491,961**	**$1,340,147,684**	**$1,730,498,009**	**$1,614,107,878**	**$1,667,308,793**
Plan Fiduciary Net Position as a % of Total Pension Liability	69.54%	69.15%	57.71%	60.02%	58.13%
Covered Payroll	$ 367,493,332	$ 359,409,940	$ 363,980,262	$ 362,747,630	$ 353,751,292
Employers' Net Pension Liability as a % of Covered Payroll	365.58%	372.87%	475.44%	444.97%	471.32%

Continued on next page.

(1) Starting fiscal year 2022, Service Cost includes disability expense, service purchases, and transfers from other systems.
(2) Starting fiscal year 2022, Benefit Payments includes disability premiums and transfers to other systems.
(3) Starting fiscal year 2022, Contributions – Employee includes service purchases and transfers from other systems.

Schedule of Changes in the Employers' Net Pension Liability
Year Ended June 30 (continued)

	2017	2016	2015	2014	2013
Total Pension Liability					
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
Benefit Changes	0	0	0	0	0
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)
Net Change in Total Pension Liability	**40,710,726**	**45,887,353**	**65,603,910**	**66,266,182**	**277,696,888**
Total Pension Liability – Beginning	**3,761,733,004**	**3,715,845,651**	**3,650,241,741**	**3,583,975,559**	**3,306,278,671**
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**
Plan Fiduciary Net Position					
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)
Net Change in Plan Fiduciary Net Position	**177,701,094**	**(17,293,188)**	**51,910,921**	**271,723,503**	**144,329,164**
Plan Fiduciary Net Position – Beginning	**1,992,073,946**	**2,009,367,134**	**1,957,456,213**	**1,685,732,710**	**1,541,403,546**
Plan Fiduciary Net Position – Ending (b)	**$2,169,775,040**	**$1,992,073,946**	**$2,009,367,134**	**$1,957,456,213**	**$1,685,732,710**
Adjustment – GASB 75 Implementation	**(936,418)**				
Plan Fiduciary Net Position – Ending (as restated)	**$2,168,838,622**				
Employers' Net Pension Liability (a) – (b)	**$1,633,605,108**	**$1,769,659,058**	**$1,706,478,517**	**$1,692,785,528**	**$1,898,242,849**
Plan Fiduciary Net Position as a % of Total Pension Liability	57.06%	52.96%	54.08%	53.63%	47.04%
Covered Payroll	$ 356,515,416	$ 344,635,441	$ 342,264,593	$ 336,590,797	$ 323,205,767
Employers' Net Pension Liability as a % of Covered Payroll	457.95%	513.49%	498.58%	502.92%	587.32%

Schedule of Employers' Contributions
Last 10 Fiscal Years

	Actuarially Determined Contributions	Actual Contributions	Contribution Deficiency (Excess)	Covered Payroll*	Contributions as a Percentage of Covered Payroll
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
2018	204,955,180	204,955,180	0	353,371,000	58.00
2019	210,166,927	210,166,927	0	362,356,771	58.00
2020	210,871,852	210,871,852	0	363,572,159	58.00
2021	208,212,848	208,212,848	0	358,987,669	58.00
2022	212,711,117	212,711,117	0	366,743,305	58.00

**Values are estimated from contribution rate and actual contribution amount.*

Schedule of Investment Returns
Last 10 Fiscal Years

Fiscal Year Ended June 30	Annual Money-Weighted Rate of Return
2013	13.37%
2014	17.58
2015	6.62
2016	1.02
2017	11.22
2018	9.20
2019	6.84
2020	(0.44)
2021	30.79
2022	4.00

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, 2022
Actuarial Cost Method .... Entry Age
Amortized Method .... Level Percentage of Payroll, Closed
Remaining Amortization Period .... 11 Years (single equivalent period)
Asset Valuation Method .... 3-Year Smoothed Market: 20% Corridor
Inflation .... 2.25% (price inflation)
Actuarial Assumptions
Investment Rate of Return 6.5%
Projected Salary Increase .... 3.0% to 12.45% (includes 3.0% wage inflation)
Cost-of-Living Adjustments .... 1.8% Compound

Other Post-Employment Benefits (OPEB) Plan
Schedule of Changes in Net OPEB Liability and Related Ratios for
MoDOT and MSHP Medical and Life Insurance Plan

	2022	2021	2020	2019	2018
Total OPEB Liability					
Service Cost	$ 74,581	$ 51,302	$ 64,136	$ 66,676	$ 81,000
Interest Cost	45,896	55,700	61,346	54,714	49,929
Changes of benefit terms	0	0	0	0	0
Differences between expected and actual experience	263,007	452	(17,475)	(12,565)	0
Changes in assumptions	(368)	393,621	(58,897)	(81,559)	(238,129)
Benefit Payments	(35,099)	(33,865)	(35,159)	(34,004)	(37,055)
Net Change in total OPEB liability	348,017	467,210	13,951	(6,738)	(144,255)
Total OPEB Liability (Beginning)	**2,019,603**	**1,552,393**	**1,538,442**	**1,545,180**	**1,689,435**
Total OPEB Liability (Ending)	**$ 2,367,620**	**$ 2,019,603**	**$ 1,552,393**	**$ 1,538,442**	**$ 1,545,180**
Plan Fiduciary Net Position					
Contributions	$ 35,099	$ 33,865	$ 35,159	$ 34,004	$ 37,055
Benefit Payments	(35,099)	(33,865)	(35,159)	(34,004)	(37,055)
Net Change in Plan Fiduciary Net Position	**0**	**0**	**0**	**0**	**0**
Plan Fiduciary Net Position (Beginning)	**0**	**0**	**0**	**0**	**0**
Plan Fiduciary Net Position (Ending)	**$ 0**	**$ 0**	**$ 0**	**$ 0**	**$ 0**
Net OPEB Liability (Ending)	$ 2,367,620	$ 2,019,603	$ 1,552,393	$ 1,538,442	$ 1,545,180
Net Position as a Percentage of OPEB Liability	N/A	N/A	N/A	N/A	N/A
Covered-Employee Payroll	$ 1,889,323	$ 1,791,020	$ 1,760,722	$ 1,639,523	$ 790,000
Net OPEB Liability as a Percentage of Payroll	125.32%	112.76%	88.17%	93.83%	195.59%

Other Post-Employment Benefits (OPEB) Plan
Schedule of MPERS' Proportionate Share of Net OPEB Liability
for MoDOT and MSHP Medical and Life Insurance Plan

Year Ended June 30	Proportion of Net OPEB Liability	Proportionate Share of Net OPEB Liability	Covered Employee Payroll	Net OPEB Liability as % of Covered Employee Payroll	Net Position as % of Total OPEB Liability
2018	0.14%	$1,545,180	$ 790,000	195.59%	N/A
2019	0.14%	1,538,442	1,639,523	93.83%	N/A
2020	0.15%	1,552,393	1,760,722	88.17%	N/A
2021	0.15%	2,019,603	1,791,020	112.76%	N/A
2022	0.17%	2,367,620	1,889,323	125.32%	N/A

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 Administrative Expenses
For the Year Ended June 30, 2022

Personnel Services	
Salary Expense	$ 2,371,340
Employee Benefit Expense	1,882,725
Total Personnel Services	**4,254,065**
Professional Services	
Actuarial Services	89,365
Audit Services	57,750
Legislative Consultant	31,200
Board Governance	66,500
Investment Special Consulting	25,000
Insurance Consultant	6,000
Other Consultant Fees	43,544
Fiduciary Insurance	25,230
IT Hosting and Support	318,868
Other	14,544
Total Professional Services	**678,001**
Miscellaneous	
Depreciation	23,328
Meetings / Travel / Education	52,780
Equipment / Supplies	84,676
Printing / Postage	22,555
Bank Service Charge	9,107
Building Expenses	35,231
Other	69,275
Total Miscellaneous	**296,952**
Total Administrative Expenses	**$ 5,229,018**

Schedule of Investment Expenses
For the Year Ended June 30, 2022

Investment Income Expenses	
Management and Performance Fees by Asset Class	
Equities	$ 2,396,140
Fixed Income Core	195,435
Opportunistic Debt	14,070,964
Real Estate	6,615,684
Private Equity	16,932,298
Real Assets	21,037,315
Hedge Funds	5,928,621
Total Management and Performance Fees	**$67,176,457**
Investment Custodial Fees	69,959
Performance Management	230,962
General Consultant (Monitoring) Fee	358,862
Professional Fees	499,105
Other Fees / Expenses	834,599
Total Investment Income Expenses	**$69,169,944**
Securities Lending Expenses	
Borrower Rebates (Refunds)	$ 25,350
Bank Fees	78,732
Total Securities Lending Expenses	**$ 104,082**

Schedule of Consultant and Professional Expenses
For the Year Ended June 30, 2022

Professional / Consultant	Nature of Service	
Gabriel, Roeder, Smith & Co.	Actuarial	$ 89,365
LexisNexis Risk Data Management	Death Audit Services	1,800
MO Department of Health & Senior Services	Death Audit Services	603
Pension Benefit Information	Death Audit Services	10,326
Deaf Heart Interpreting Services, LLC	Death Audit Services	1,815
Naught-Naught Agency	Director’s & Officer’s Insurance	22,942
Alliant Insurance Services, Inc.	Employee Crime Bond	2,288
Williams-Keepers, LLC	Financial Audit Services	57,750
Funston Advisory Services, LLC	Governance Consulting	66,500
Midwest Computech	Information Technology	42,898
Huber & Associates	Information Technology	3,575
Levi, Ray & Shoup, Inc.	Information Technology	266,523
Sikich, LLP	Information Technology	5,872
Thompson Coburn, LLP	Legal Consulting	43,544
Michael G. Winter Consultants, LLC	Legislative Consulting	31,200
Evercore Group, LLC	Market Research	25,000
Charlesworth Benefits	Risk Management Consulting	6,000
Total Consultant and Professional Expenses		**$678,001**

Investment Section

September 29, 2022

To the Board of Trustees and System Members:

It is my pleasure to provide the Investment Section of this year's Annual Comprehensive Financial Report (Annual Report). This letter is an overview of investment performance during the past year and staff's expectations of the investment market in the years to come.

"A Foundation for the Future" is this year's annual report theme, which is very appropriate given MPERS' investment performance over the past few years. After a remarkable Fiscal Year 2021 where the investment portfolio generated a 30.8% return, MPERS was able to build on that foundational success and generate a positive 3.9% return in Fiscal Year 2022 (net of all management fees and based on time-weighted rates of return and market valuations). This is a notable outcome given the weakness in both the public stock and bond markets, as a traditional 60/40 mix of stocks and bonds lost 13.8% for the year. Staff also outperformed MPERS' policy benchmark (the return you would expect to earn if you invested passively across the targeted asset allocation) by 8.3% for the year, as that benchmark was down 4.35%.

Building a solid foundation starts with a solid footing, or a solid asset allocation in the case of an investment portfolio. MPERS' diversified portfolio was built to do well across a wide range of economic environments, not just when the public stock and bond markets are increasing in value. That foundation served the System well in Fiscal Year 2022, as the portfolio survived and even grew during a year filled with economic adversity. Last year at this time, MPERS had just posted a positive 30.8% return, global equity markets were trading at all-time highs, and interest rates were at historic lows. Governments around the world were adding an unprecedented amount of liquidity and stimulus to support the global economy as it recovered from COVID-19, which was supporting asset prices and creating inflationary pressures in raw materials and labor rates. Last year, we expected another round of adversity would eventually occur and suggested that tempering return expectations and building liquidity was the prudent investment strategy over the coming period. That proved to be insightful advice, as over the course of Fiscal Year 2022 a new round of volatility hit the markets led by Russia's invasion of Ukraine and the ongoing challenges from COVID-19. Throughout the year, countries around the world responded with banking and economic sanctions against Russia, effectively cutting Russia off from most of the developed world. This led to massive disruption in the oil and gas markets (given Russia's status as a major oil and gas exporter), sending energy prices soaring. Coupled with the existing supply chain disruptions stemming from COVID19 and soaring asset valuations, U.S. inflation levels climbed to over 9% for the first time since the early 1980s. Interest rates spiked, the Federal Reserve started to raise interest rates, and stock markets traded sharply lower to adjust to the new market environment.

The positioning of MPERS' portfolio and the diverse mix of investment strategies provided protection against the difficult markets, led by the real assets portfolio (which is thriving during this inflationary period) and gains in the private equity and opportunistic credit portfolios. The use of alternative investment structures was always the pillar and foundation to the restructuring of the investment portfolio 15 years ago – designed specifically to lower the volatility of the portfolio and protect the corpus of the fund in times of market stress. This was never more evident than Fiscal Year 2022, as the alternative strategies in the portfolio led to further overall investment gains during a time when most of our peers took a step backward. MPERS' Fiscal Year 2022 return of 3.9%, while missing the actuarial hurdle of 6.5%, easily outperformed both the policy benchmark, which lost 4.3% (the hypothetical return earned by investing passively across the targeted asset allocation) and the median public fund, which lost 10.8%. MPERS' portfolio investment return now ranks in the top 1% of the peer universe over the past 1-, 3-, 5-, 10-year return periods. The numbers look equally impressive on a risk-adjusted basis, as MPERS continues to maintain a lower risk profile than 99% of our peer group (with risk measured by standard deviation of returns over the past 10-year period). The combination of strong returns and low risk has produced a risk/return profile (as measured by a system's Sharpe Ratio) that also ranks in the top 1% of the peer universe over the same measurement periods.

While we are certainly proud of this historical performance, we are also mindful of what potentially lies ahead. As we look forward to Fiscal Year 2023 and beyond, a lot of uncertainty remains in the market. The alternative investment strategies that protected the portfolio so well in Fiscal Year 2022 are not immune to losses, and time will eventually reveal whether they will also fall in price to reflect the public market trends. The Federal Reserve is on pace to raise the overnight Fed Funds Rate to 4.5%, a level not seen since 2007 (before the financial crisis). The housing market, which saw massive appreciation during the COVID-19 pandemic, will need to adjust to a “new normal,” which includes 30-year mortgage rates above 7% (a level not seen since the late 1990s). The higher interest rate environment will put pressure on corporate profits and the earnings multiple investors are willing to pay to own equities. Many investors have never witnessed a market with rising inflation and interest rates and will need to adapt to the changing market conditions. The excess liquidity in the market, brought about by government stimulus programs and loose monetary policies after the pandemic, will ultimately need to be removed from the market to bring inflation back under control. This will likely take years to accomplish and could be painful for a lot of investors.

Fortunately, in the case of MPERS, we have built a solid foundation, which provides the flexibility to navigate difficult markets. The diversified portfolio, while not immune to future losses, has positive momentum that should serve the System well as markets adjust to the new investment climate. Unlike many of our peers, MPERS’ strong investment performance and solid funding policies have led to significant improvement in the System’s funded status. We are truly building “a Foundation for the Future” that will benefit current and future members alike and look forward to the years that lie ahead.

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
Chief Investment Officer

Kevin M. Leonard
Partner

NEPC LLC
255 State Street
Boston, MA 02109

September 19, 2022

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

RE: 2022 Annual ACFR Letter

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 2022 Performance and Key Initiatives

For the fiscal-year-ending June 30, 2022, the MPERS Total Plan returned +3.9% on a net-of-fees basis, outperforming the policy index return of -4.3%. For the fiscal-year-ending June 30, 2022, relative to the peer group comparison (InvMetrics Public DB Net Universe), MPERS ranked in the 1st percentile (1st percentile being the highest, 100th percentile being the lowest). For the fiscal year, total Plan outperformance (relative to policy index) was driven by relative outperformance in the public equities, private equity, traditional fixed income, opportunistic debt, and the real asset portfolios. The only portfolio to underperform its respective benchmark was the real estate portfolio with a return of 23.6% versus 28.9% for the benchmark. Although underperforming its benchmark, the real estate portfolio was the second highest absolute performing portfolio for the year with its return of 23.6%.

During Fiscal Year 2022, key initiatives accomplished included:

- Conducted a comprehensive/formal review of the Plan's asset allocation in concert with NEPC's 2022 Client Actions and Asset Class Assumptions.
    - 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, no changes were recommended.

- 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.

- Implemented the restructuring of the public equities' portfolio from the analysis that began during FY 2021.

- Continued to develop 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.
    - New commitments were made to the 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.

Best Regards,

Kevin M. Leonard, Partner

Summary of Investment Policy

The primary objective of the Missouri Department of Transportation and Highway Patrol Employees' Retirement System (MPERS, Plan or System) 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 combined with 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 (Board) in its role as fiduciary. The Board has adopted the following guiding principles to fulfill its fiduciary duty:

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

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

- define the assumed rate of return for the portfolio (currently 7%),
- establish an asset allocation that is expected to meet the assumed rate of return while minimizing the volatility of the fund's 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, and
- establish ongoing due diligence requirements for existing managers.

Throughout the Investment Policy, two key investment beliefs dominate the daily management of the investment portfolio.

1. Diversification is critical because the future is unknown.
2. Flexibility in investment policy implementation is critical because particular asset classes will be in or out of favor at various 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 deviation 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 Characteristic	1-Year	3-Year	5-Year	10-Year
Annualized Total Plan Return (net of all fees and expenses)	3.94%	10.61%	9.61%	9.71%
Annualized Policy Benchmark Return	***-4.34%***	***7.11%***	***7.56%***	***7.98%***
Annualized Peer Median Return	***-10.81%***	***5.46%***	***6.18%***	***7.41%***
Total Plan Standard Deviation (1)	6.29	7.48	6.35	5.18
Policy Benchmark Standard Deviation	***7.29***	***8.33***	***7.15***	***5.71***
Peer Median Standard Deviation	***10.35***	***12.18***	***10.92***	***8.85***
Total Plan Sharpe Ratio (2)	0.62	1.29	1.29	1.68
Policy Benchmark Sharpe Ratio	***-0.59***	***0.78***	***0.90***	***1.26***
Peer Median Sharpe Ratio	***-1.07***	***0.44***	***0.50***	***0.78***
Correlation to Policy Benchmark (3)	0.95	0.92	0.92	0.89

(1) *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.

(2) *Sharpe Ratio* measures historical volatility and specifically measures the dispersion of a set of data point (i.e. monthly returns from their mean. If the data points are further from the mean, the standard deviation is higher.

(3) *Correlation* measures how the System's portfolio and the policy benchmark moves are related and if both have reacted to market forces in the same manner. The System's portfolio has 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.

When evaluating these results, it is 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, real assets with its CPI + 4% real return benchmark, and the real estate 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. Investment 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 provides the Board with the confidence that it has adopted a prudent investment strategy, fulfilling the Board's fiduciary duty.

Fair Value of Investments

As of June 30, 2022, MPERS' investment portfolio had a total fair value of $3.061 billion, representing an increase of $58 million from Fiscal Year 2021. Over the course of the year, $61 million was transferred out of the fund to make benefit payments and meet other obligations. When viewed together, the net increase to the portfolio from investment activity equaled $119 million.

Investment Performance

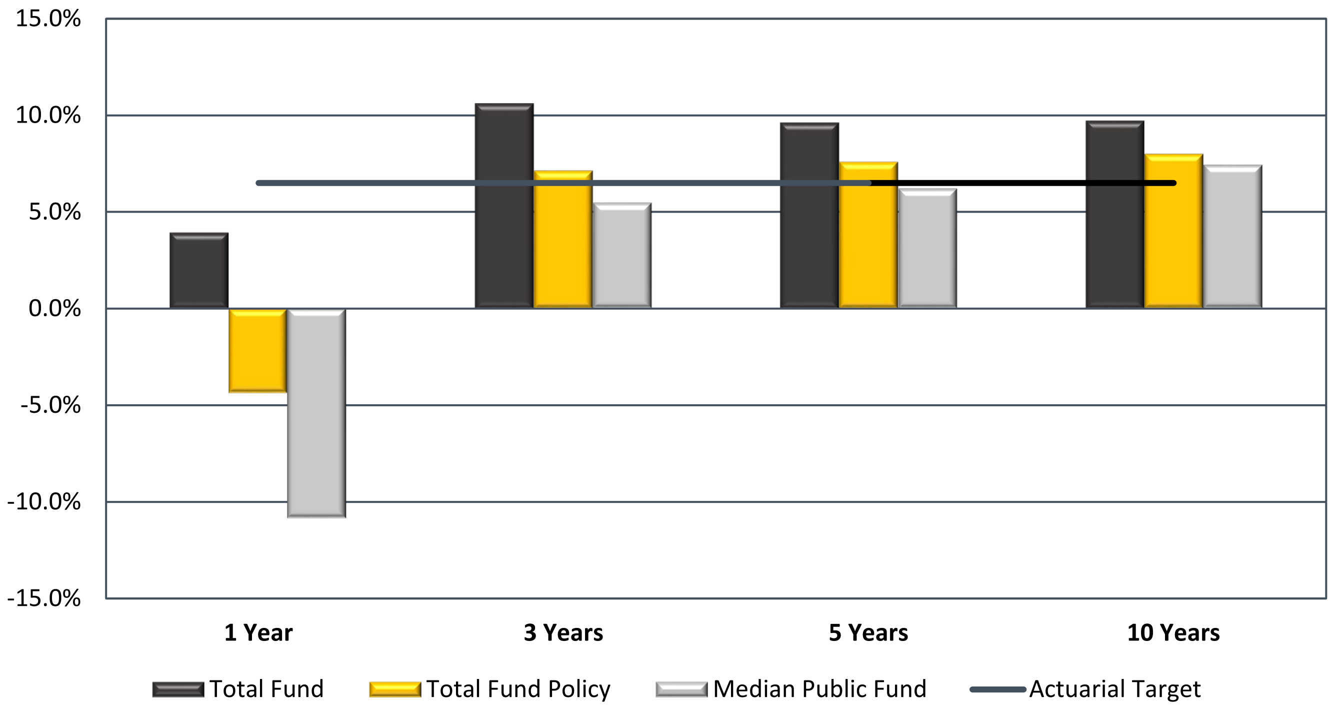
MPERS' investment portfolio generated a 3.94% return for Fiscal Year 2022, net of all investment fees and based on time-weighted rates of return and market valuations. The performance across the major asset classes (and respective benchmarks) is listed below.

Investment Performance (Including Benchmarks)	1-Year	3-Year	5-Year	10-Year
Total Fund	**3.94%**	**10.61%**	**9.61%**	**9.72%**
Policy Benchmark	*-4.35*	*7.11*	*7.56*	*7.98*
Peer Universe Ranking %	*1.00*	*1.00*	*1.00*	*1.00*
Equity Beta	**-2.51**	**12.60**	**N/A**	**N/A**
*Equity Beta Benchmark**	*-8.78*	*9.46*	*9.92*	*11.06*
Public Equity	-11.36	7.68	N/A	N/A
MSCI ACWI	*-15.75*	*6.21*	*7.54*	*9.32*
Private Equity	20.34	23.72	20.86	16.76
S&P 500 + 3%	*19.09*	*22.45*	*19.43*	*18.04*
Rates and Credit Beta	**0.98**	**5.50**	**N/A**	**N/A**
*Rates and Credit Beta Benchmark**	*-11.34*	*-0.53*	*1.31*	*2.54*
Traditional Fixed Income	-7.34	1.42	2.94	4.59
Barclays US AGG Gov/Credit	*-10.85*	*-0.77*	*1.05*	*1.89*
Opportunistic Debt	14.01	11.32	10.66	N/A
Barclays US Corp HY	*-12.81*	*0.21*	*2.10*	*4.47*
Real Asset Beta	**27.12**	**11.18**	**N/A**	**N/A**
*Real Asset Beta Benchmark**	*21.15*	*10.72*	*9.05*	*8.56*
Real Estate	23.58	13.10	12.06	12.52
NFI-ODCE	*28.90*	*12.28*	*10.07*	*10.43*
Real Assets	29.51	9.66	8.32	N/A
CPI + 4%	*13.39*	*9.16*	*8.02*	*6.69*

**Calculated based on the policy weights for each beta group and its benchmark return.*
All of MPERS' investment returns are reported net of all investment fees.

When evaluating performance, the Board of Trustees looks at three primary performance objectives: a) meet or exceed the actuarial assumed rate of return of 7% over long periods of time, b) 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, and c) rank at or above the public fund peer group's median investment return.

Historical returns compared to the three primary performance goals are listed graphically below:



MPERS' investment portfolio returned 3.94% for Fiscal Year 2022. While the performance was not as large as Fiscal Year 2021's 30.8% return, it was strong when compared to MPERS' policy return and the median public plan. On those two measures, Fiscal Year 2022 is the strongest performance MPERS' staff has achieved. While the median public fund lost approximately 10%, MPERS posted positive returns. MPERS' outperformance compared to the policy index was over 8%, the largest outperformance on record. Downside protection was accomplished using two key investment beliefs of the System: diversification and implementation flexibility. Most of the System's active management strategies worked this year. In the equity beta portfolio, the realized return in public equities outperformed the benchmark by about 4% and private equity outperformed public equity by about 36%. In the rates and credit beta portfolio, our underweight to interest rate risk and our credit choices added about 3.5%, while our private credit strategy outperformed the public market comparison by almost 27%. In total, MPERS' real asset beta group returned 27.12% versus its benchmark of 21.15%. While Fiscal Year 2022 performance did miss the 6.5% actuarial target, earning the actuarial target every year is not expected, and the System's long-term returns comfortably exceed the actuarial target.

MPERS' long-term performance remains excellent according to any metric. MPERS' three-, five-, and ten-year returns rank in the top 1% of the public fund peer universe, with a risk profile (as measured by volatility of returns) in the bottom 1% of the same peer universe.

Asset Allocation Overview

The Board of Trustees reviews MPERS' asset allocation annually, with a more formal asset/liability study completed at least every five years (the most recent study was completed in Fiscal Year 2020). The asset allocation in place today is a culmination of over 15 years of restructuring the portfolio with the goal of performing well across various market environments, not just when the stock market is strong or on the rise. Those efforts have served the System well, generating consistent performance results with a lower risk profile (as measured by standard deviation of returns). MPERS' one-, three-, five- and ten-year returns have a Sharpe ratio that ranks in the top 1% of the public fund peer universe (a Sharpe ratio measures a system's risk-adjusted returns, or the amount earned for a given level of risk). The reduced volatility in the portfolio has also lowered the volatility of contribution rates for the employers, which have now remained stable for ten consecutive years after climbing considerably following the financial crisis

MPERS' breaks down all investment strategies into three broad beta groups (equities, interest rates and credit, and real assets). As of June 30, 2022, all the sub-asset class allocations were within the acceptable ranges established by MPERS' Investment Policy. The table below lists the ending allocations as of June 30, 2021, along with the target and actual asset allocation as of June 30, 2022. Following the table are descriptions of each beta group and its underlying assets.

Beta Group *Sub-Asset Allocation*	Ending FY 21 Allocation	FY 22 Target Allocation	Ending FY 22 Allocation
Equity Beta	**51.93%**	**50.00%**	**49.98%**
Public Equity	*36.03*	*40.00*	*34.08*
Private Equity	*15.90*	*10.00*	*15.91*
Rates and Credit	**25.77**	**30.00**	**26.62**
Traditional Fixed Income	*15.41*	*22.50*	*15.76*
Opportunistic Debt	*10.35*	*7.50*	*10.86*
Real Assets	**18.19**	**20.00**	**23.02**
Real Assets	*11.10*	*10.00*	*14.26*
Real Estate	*7.09*	*10.00*	*8.76*
Cash	**4.11**	**0.00**	**0.37**

Equity Beta

The equity beta group is comprised of two asset types: public equity and private equity. The equity beta group currently represents 49.98% of the overall portfolio. Within that overall equity allocation, the fund is overweight private equity structures (15.91% versus the target of 10%), which is offset by an underweight to public equity (34.08% versus new target of 40%). The result of the current positioning is an underweight to the traditional equity markets. The equity beta group returned -2.51% relative to the MSCI ACWI return of -15.75%, resulting in outperformance of 13.24%, highlighting the role that private equity can play during a difficult year for the broader public equity markets.

Public Equity

MPERS' public equity portfolio ended Fiscal Year 2022 with a -11.36% return, outperforming the global equity policy benchmark which fell in value by 15.75%. The outperformance relative to policy benchmarks was attributable to the restructured equity portfolio, which is now referred to as the diversified beta allocation. Diversified beta was implemented to create more stable excess returns (relative to the public equity benchmark) compared to traditional active management strategies. The migration to diversified beta resulted in the liquidation of most of MPERS' traditional public market equity managers, which was implemented after a sharp rebound in performance from several small cap and value managers. That implementation proved timely as the value and small cap strategies performed poorly in the weak market while the hedge fund and bond strategies (portable alpha) within diversified beta posted positive returns. The remaining active management strategies (two microcap value strategies) also outperformed the broader equity markets which further contributed to the excess returns.

Private Equity

On January 1, 2019, MPERS lowered the target to private equity from 15% to 10%. While private equity continues to be the best performing asset class in MPERS' portfolio over the long term, staff is cognizant of the significant amount of money raised in the sector over the past several years and the risks that it brings to future performance. Staff continues to slow the pace of new commitments; however, the strong performance within the asset class has made it difficult to reduce the overall allocation. New commitments are focused on existing managers coming back to market and have performed well. The portfolio continues to mature nicely as evidenced by Fiscal Year 2022 being the seventh consecutive year where distributions from investments outpaced new capital calls. As the portfolio matures and less money is committed to new funds in the coming years, the allocation to private equity should gradually decline in the direction of the new target allocation.

Private equity generated a 20.34% fiscal year return, outperforming the benchmark return (S&P 500 + 3%) of 19.09%. Fiscal Year 2022 was a year where private equity displayed its purpose in a portfolio, generating excellent results as traditional public equity markets lost value. This is the purpose of private equity; to deliver strong long-term returns and serve as an anchor when public equity markets experience prolonged periods of volatility. It is important to note the lagged nature of private equity valuations and the corresponding benchmark performance. MPERS utilizes a three-month lagged S&P 500 benchmark (plus a 3% illiquidity premium) to approximate the valuation lag private equity has relative to public equity markets. This year is an excellent example of how the pricing lag can impact returns, as most of the equity market losses came in the last six months of the fiscal year.

The broader public equity benchmark lost 15% during the year, while the lagged private equity benchmark was up over 19% for the year. Staff certainly expects to see some valuation adjustments to the private equity portfolio should public equity markets continue to trend downward.

Rates and Credit Beta

The rates and credit beta group consists of the traditional fixed income portfolio and the opportunistic debt portfolio. The overall allocation stands at 26.62% versus the new target of 30%. During Fiscal Year 2022, this beta group returned 0.98% versus the benchmark of -11.34%. On a more granular level, the traditional fixed income subcomponent delivered a -7.34% return (versus the benchmark of -10.85 %), while the opportunistic debt subcomponent gained 14.01% (versus the benchmark of -12.81%).

Traditional Fixed Income

MPERS remained consistently underweight the traditional fixed income target allocation throughout Fiscal Year 2022 and ended the year with a 15.76% allocation (compared to the target asset allocation of 22.5%). Yields on U.S. Treasury bonds rose during the year, with the 10-year Treasury bond rising from 1.44% to 2.97% and the 30-year Treasury bond rising from 2.07% to 3.12%. The rising interest rate environment sent existing bond prices lower, which led to the -10.85% return for the fixed income benchmark. The unique structure and lower duration profile of MPERS' traditional fixed income portfolio (relative to the benchmark) was able to limit losses to 7.34% return for the year, which represents a 3.5% outperformance.

This year was dramatically different for the traditional fixed income markets, as the Federal Reserve surprised the market by aggressively raising rates to combat high inflation. Rate increases cause previously issued bonds to lose money, as evidenced by the benchmark return which lost almost 11%. In the alternative, higher rates also result in higher returning fixed income investments in the future, so prospective returns in the bond market are much better than at any time over the past decade. Another surprise or differentiating factor was that bonds lost money at the same time as stocks. Bonds are historically believed to be a diversifying investment relative to equities and, as such, should dampen portfolio losses when equities lose money, but, both equities and bonds lost money this year. The higher interest rate environment naturally puts pressure on corporate profits and the earnings multiple that investors are willing to pay to own equities. Until the Federal Reserve can bring inflation under control, it is likely that both stocks and bonds will trade in the same direction (meaning bonds will not offer protection against falling equity markets).

Opportunistic Debt

The offset to MPERS' underweight position to traditional fixed income is a modest overweight position of opportunistic debt strategies. The year began with a 10.35% allocation relative to a 7.5% policy target and ended at 10.86%. The asset class generated a 14.01% return, which outperformed the publicly traded high yield benchmark return of -12.81%.

The opportunistic debt portfolio is diversified among direct lending, public market investments, and distressed investments. The portfolio is largely built out and most of the focus in recent years has been on pivoting commitments away from direct lending and toward strategies that have flexibility to be more opportunistic. Recent commitments to opportunistic strategies were done in anticipation of a more volatile environment in future years. Many of those strategies continue to have dry powder (ability to deploy new capital) and staff expects those strategies to benefit from continued uncertainty in the global economy. The pace of new commitments is expected to be in line with past years and should be partially funded by rotating exposure from underperforming legacy investments to strategies expected to benefit in a more uncertain economic environment.

Real Assets Beta

The real assets beta group includes MPERS' real estate holdings along with the broader real asset strategies, e.g., energy, infrastructure, timber, and mining. The overall allocation to the real assets beta group stands at 23.02% (relative to the target allocation of 20%) and generated a 27.12% return (versus a benchmark of 21.15%) in Fiscal Year 2022. The broader real asset strategies returned 29.51% for the year (versus the benchmark of 13.39%), with the various real estate strategies producing a 23.58% return (versus the benchmark of 28.90%).

Real Estate

The underlying real estate allocation has a target of 10% of assets and includes a mix of public and private equity strategies, as well as tactical exposures to public and private debt strategies. MPERS started the year with a 7.09% allocation and ended with an 8.76% allocation. The portfolio generated a 23.58% return for the year, underperforming the policy benchmark return of 28.90%. The core real estate portfolio (primarily stabilized and fully leased properties) generated a 31.54% return, while the non-core portfolio (value-added or opportunistic real estate strategies) returned 23.69%.

The effects of the COVID-19 pandemic continue to create dramatic changes in the real estate markets and will likely impact the investing environment for years to come. A winner has been the industrial sector that supplies last-mile distribution centers caused by the increase in online shopping. The clear loser has been the office sector as remote work requires reduced need for office space. Given the rapid increase in borrowing rates this year, we expect real estate will face headwinds and result in lower returns next year. Most real estate is partially bought with debt, so higher rates will reduce building and transaction activity. However, several value-added and opportunistic managers in the portfolio have substantial dry powder (ability to deploy new capital) and are well positioned to benefit from this changing investment climate. Given the current underweight position, the pace of new commitments is expected to increase in the coming years.

Real Assets

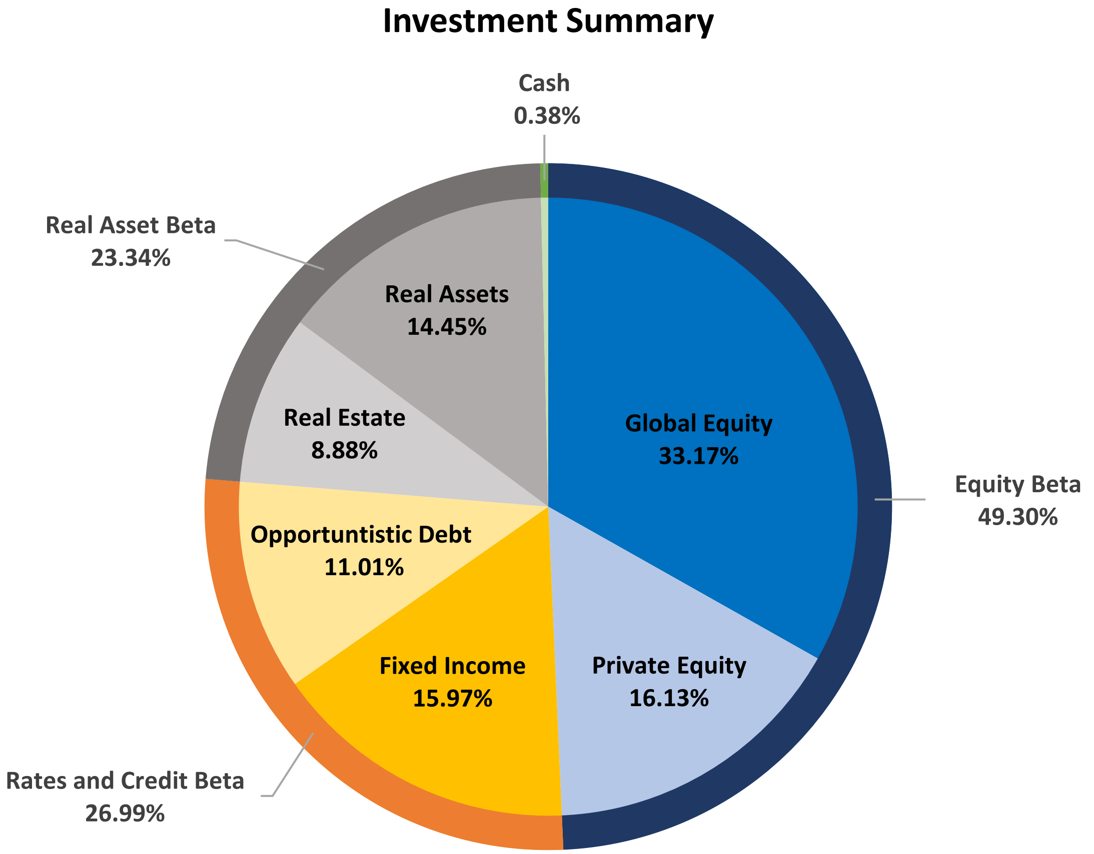
The underlying real asset allocation has a target of 10% of assets and includes a mix of natural resource strategies, infrastructure and transportation, and timber strategies. MPERS started the year with an 11.10% allocation, which grew throughout the year and ended with an 14.26% allocation. Most of that growth was attributed to investment performance, as the portfolio generated a 29.51% return for the year outperforming the policy benchmark return of 13.39%. The rebound in oil prices led to strong performance in MPERS' energy-based strategies, which represent approximately 36% of the real assets portfolio. Overall, the natural resources portfolio was up 36.07% on the year. The timber portfolio also performed well, as increases in lumber and recreational land values helped the portfolio generate a 29.70% return. MPERS' infrastructure strategies had another consistent year and produced a return of 13.34%.

Staff continues to diversify the asset class by investing in timber, metals and mining, and infrastructure assets. Commodities and real estate were at the center of the inflationary forces that swept this year's market, but they face headwinds given the Fed's interest rate increases. Most real asset strategies go through long cycles and after a prolonged period of under-investment, both commodity production and real estate development will continue to attract capital to alleviate the shortages caused by the recent under-investment. MPERS' overall commitment pacing is expected to slow because of the overweight position in the asset class and the focus will be on targeted investments which complement the existing exposures.

Looking Forward

While MPERS' portfolio successfully weathered the storm that shook the markets in Fiscal Year 2022, staff remains mindful of the risks that lie ahead. It was clearly a year that rewarded investors for having exposure to alternative investment strategies, and time will reveal whether this was temporary or permanent relief. The alternative investment strategies that protected the portfolio so well in Fiscal Year 2022 are not immune to losses, and the market remains uncertain. Today's key market risk is getting inflation under control, and the Federal Reserve is on pace to raise the overnight Fed Funds Rate to 4.5% to accomplish that goal. Many investors have never witnessed a market with rising inflation and interest rates and will need to adapt to the changing market conditions. The excess liquidity in the market brought about by government stimulus programs and loose monetary policies after the COVID-19 pandemic will need to be removed from the market to bring inflation back under control. Traditional fixed income may not provide the protection against falling equity markets that is has over the past 40 years, and the System will need to incorporate new strategies that offer diversification in the upcoming cycle.

Fortunately for MPERS, the System has a governance model in place that provides the flexibility to navigate uncertain markets along with senior investment staff with experience through market cycles. Pension fund investors will need every tool available to meet long-term goals and objectives and will have to look outside the traditional stock and bond markets to find strategies capable of generating attractive returns. Fortunately, MPERS' diversified asset allocation includes a mix of strategies designed to perform well throughout a wide range of investment markets, and staff is confident the portfolio is well positioned to meet the long-term goals of the System.



Amounts Reported by Beta Groups and Management-Type Allocation
June 30, 2022

	Fair Value	Percent of Fair Value
Global Equity		
Global Public Equity	$ 1,015,521,001	33.17%
Private Equity	493,625,323	16.13%
Hedged Equity	0	0.00%
Rates and Credit		
Fixed Income	489,001,285	15.98%
Opportunistic Debt	337,142,470	11.01%
Real Assets		
Real Estate	271,922,871	8.88%
Real Assets	442,439,097	14.45%
Cash	11,509,184	0.38%
Total Investments	$ 3,061,161,231	**100.00%**

Reconciliation to Statement of Plan Net Assets:	
Less: Accrued Investment Interest and Income	$ (6,888,453)
Less: Investment Sales Receivable	(102,034,872)
Plus: Investment Purchases Payable	106,254,795
Currency Adjustment	(23,425)
	$ 3,058,469,276

Largest Equity Securities
(Non-Commingled Funds)

Security	Fair Value	Percent of Total
CF OWL ROCK TECHNOLOGY FINANCE CORP	$11,038,253	10.0009%
BARINGS BDC INC COM	4,700,926	4.2591
ARES CAP CORP COM	3,638,553	3.2966
OAKTREE SPECIALTY LENDING CORP COM	2,965,015	2.6864
PENNANTPARK INVT CORP COM	2,953,237	2.6757
CENTRAL BANCOMPANY CDT-CL B NON VTG CDT-CL B NON VTG	2,819,420	2.5545
SLR INVT CORP COM STK	2,179,387	1.9746
BLACKROCK CAPITAL INVESTMENT CORP	1,856,279	1.6818
OWL ROCK CAP CORP COM USD0.01	1,768,800	1.6026
HANCOCK WHITNEY CORP	1,743,765	1.5799

Largest Fixed Income Securities
(Non-Commingled Funds)

Par Value	Security	Fair Value
$41,949,540	SLM STUDENT LN TR 2008 9 STUDENT LOAN BKD NTS CL A FLTG 04-25-2023 REG	$41,838,344
34,267,345	SLM STUD LN TR FLTG RT 4.483% DUE 07-25-2023	34,224,456
31,260,000	SOUTH CAROLINA STUDENT LN CORP EDUCATIONLN REV BD 2014 SER A-2 01-03-2033 REG	30,901,623
19,622,320	PVTPL BRAZOS ED LN AUTH INC SER 18-1 CL A1 FLT RT DUE 01-25-2068 BEO	19,151,127
17,670,000	BRAZOS HIGHER ED AUTH INC 02-25-2035 REG	17,464,266
17,500,000	PVTPL SLM STUDENT LN TR 2012-8 SER 12-8 CL B FLTG RT DUE 04-28-2070 BEO	16,008,710
16,076,978	PVTPL ED LN AST-BACKED TR I 2013-1 SR NTCL A2 144A VAR RT DUE 04-26-2032 BEO	15,846,417
15,000,000	FEDERAL FARM CREDIT BANK 4.2% DUE 04-07-2036 REG	14,662,553
14,828,430	PVTPL EFS VOLUNTEER NO 3 LLC STUDENT LN SER 2012-1 CL A-3 FLTG RT	14,623,642
13,886,838	SLM STUDENT LN TR 2005-5 STUDENT LN-BKD NT CL A-4 10-25-2028 REG	13,706,068
12,414,540	SLM STUDENT LN TR 2008-8 STUDENT LOAN BKD NT CL A-4 FLTG 04-25-2023 REG	12,314,305
12,050,000	NORTHSTAR ED FIN INC DEL 2007-1 STUDENT LN ASSET BKD NT CL 1A-6 01-29-2046 BEO	11,489,447
10,000,000	PVTPL SLM STUDENT LN TR SER-03-14 CL-A7 VAR 10-25-2065 BEO	9,675,009
10,000,000	UNITED STATES OF AMER TREAS BONDS 0.75 DEB TIPS 02-15-2042	11,689,158
10,000,000	UNITED STATES OF AMER TREAS BONDS DTD 05/15/2016 2.5% DUE 05-15-2046 REG	8,475,781
10,000,000	UNITED STATES TREAS BDS DTD 00247 2.5% DUE 02-15-2046 REG	8,479,297
9,600,000	EDUCATION LN ASSET BACKED TR I VAR RT 4.25% 08-01-2043 REG	8,304,000
9,212,467	PVTPL NELNET STUD LN TR 2015-2 AB NT CL A-2 144A VAR RT DUE 9-25-42 BEO	8,948,403
6,000,000	UNITED STATES TREAS BDS INDEX LINKED 1.75 DUE 01-15-2028 REG	8,789,002
849,271	MFO PIMCO PAPS ASSET BACKED SECURITIES	10,029,888

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

Investment Fees

Historically, MPERS has reported investment management fees and accrued incentive fees (performance fees), and in the last several years MPERS has expanded reporting to include fund pass-through expenses and portfolio company expenses. MPERS reports returns net of all fees and expenses; the additional fee categories reported have no impact on investment performance or returns. Comparing fees among peers is challenging given the lack of industry standard governing fee reporting. MPERS has taken a very conservative approach and reports all fees.

The strongest driver of fees is MPERS' asset allocation and use of private assets. Private assets have served an important role in MPERS' asset allocation including diversification and alpha generation. MPERS continues to monitor fees during the manager due diligence process and considers fees to be one factor when making investment decisions. MPERS strives to produce the highest net-of-fee returns regardless of the investment structure.

Summary of Investment Expenses
For the Year Ended June 30, 2022

Investment Income Expenses	
Management and Performance Fees by Asset Class	
Equities	$ 2,396,140
Fixed Income Core	195,435
Opportunistic Debt	14,070,964
Real Estate	6,615,684
Private Equity	16,932,298
Real Assets	21,037,315
Hedge Funds	5,928,621
Total Management and Performance Fees	**$67,176,457**
Investment Custodial Fees	69,959
Performance Management	230,962
General Consultant (Monitoring) Fee	358,862
Professional Fees	499,105
Other Fees / Expenses	834,599
Total Investment Income Expenses	**$69,169,944**

Expenses Accrued, Fiscal Year 2022

Manager	Base Fees	Pass Through Fund Expenses [1]	Performance Fees	Portfolio Company Expenses [2]	Total
Aberdeen Asset Management	$ 2,250	$ 0	$ 0	$ 0	$ 2,250
ABRY Partners	14,312	4,924	9,612	0	28,848
Acadian Asset Management	874,745	0	0	0	874,745
Aisling Capital	67,298	25,479	(2,716,452)	0	(2,623,675)
Alpstone Capital	64,998	0	0	0	64,998
American Timberlands Company	261,330	0	0	0	261,330
Anchorage Capital Group	296,112	0	1,711,284	0	2,007,396
Ares Management	390,011	26,538	0	0	416,549
Arrowroot Capital	397,102	4,582	623,051	0	1,024,735
Banner Ridge Partners	813,874	19,673	2,568,620	0	3,402,167
Blackstone Alternative Asset Management	927,625	0	1,659,439	0	2,587,064
Blackstone	482,051	155,386	3,752,656	0	4,390,093
Blue Road Capital	106,720	14,710	285,279	0	406,709
Bridgewater Associates	830,315	20,247	0	0	850,562
Brooke Private Equity Advisors	15,000	(11,571)	1,732	0	5,161
CarVal Investors	69,434	0	535,280	0	604,714
Carlyle Aviation Partners	131,224	0	(68,699)	0	62,525
CBRE Investors	125,972	9,991	40,959	0	176,922
Centersquare Investment Management	643,835	0	0	0	643,835
CIM Group	199,321	34,993	1,037,493	0	1,271,807
Clarion Partners	44,692	0	0	0	44,692
Corrum Capital	149,622	59,610	0	0	209,232
DC Capital	191,781	16,621	585,830	0	794,232
Drive Capital	449,888	46,851	1,657,869	0	2,154,608
Dyal Capital Partners	400,000	56,759	1,873,228	0	2,329,987
Energy & Mineral Group	556,670	54,068	1,415,883	0	2,026,621
Fortress Investment Group	47,731	35,854	273,411	0	356,996
Francisco Partners	101,212	64,351	593,719	0	759,282
Golden Sciens Marine Investments Ltd	103,171	18,646	0	0	121,817
Grey Rock Energy Partners	397,836	246,098	9,401,391	0	10,045,325
Grove Street Advisors	312,500	0	2,168,893	0	2,481,393
Heartwood Partners	93,727	13,902	714,830	0	822,459
Indus Capital Partners	125,766	0	(302,020)	0	(176,254)
Kennedy Capital	811,111	0	0	0	811,111
KKR	144,852	46,257	115,106	0	306,215
KPS Capital Partners	56,610	32,216	2,123,419	0	2,212,245
Long Ridge Equity Partners	259,571	167,712	154,625	0	581,908
Longford Capital Management	656,306	46,626	(486,027)	0	216,905
Luxor Capital Group	5,034	0	0	0	5,034

Continued on next page.

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

(2) *Portfolio Company Expenses* are fees or costs paid to the general partners (fund managers) of private equity funds which are not applied as offsets to gross management fees. These charges are paid by the underlying portfolio companies of the funds, and therefore, are indirectly paid by MPERS.

Expenses Accrued, Fiscal Year 2022 (continued)

Manager	Base Fees	Pass Through Fund Expenses [1]	Performance Fees	Portfolio Company Expenses [2]	Total
M&G Investments	$ 22,835	$ 47,033	$ 46,409	$ 0	$ 116,277
Metacapital Management	2,081	0	0	0	2,081
MGG Investment Group	219,961	0	440,811	0	660,772
Millennium Management	1,976,105	0	480,723	0	2,456,828
Miravast	163,039	23,216	173,574	0	359,829
Monomoy Capital Partners	0	36,546	1,069,821	0	1,106,367
Natural Gas Partners	152,308	17,032	664,102	0	833,442
New Mountain Capital	112,680	32,987	410,750	0	556,417
NewQuest Capital Partners	122,016	(41,175)	(12,352)	0	68,489
Nexus Capital Management	416,213	0	0	0	416,213
Northern Shipping	123,595	8,124	344,273	0	475,992
Oak Street Real Estate	114,427	234,773	684,672	0	1,033,872
OCP Asia Limited	205,155	162,366	(153,218)	0	214,303
Octagon Credit Investors	155,974	0	0	0	155,974
OpenGate Capital	94,789	5,397	652,877	0	753,063
Orion Mine Finance Group	372,382	(183,787)	560,016	0	748,611
Owl Rock Capital Partners	203,297	56,923	148,132	0	408,352
Parametric	419,969	0	0	0	419,969
Pentwater Capital Management	219,192	(594,689)	513,804	0	138,307
Pfingsten Partners	59,400	6,880	1,130,461	0	1,196,741
PIMCO	25,958	0	0	0	25,958
Principal Global Investors	757,108	0	0	0	757,108
Quantum Energy Partners	259,275	75,936	1,773,303	0	2,108,514
Ridgewood Energy	418,947	119,158	1,550,364	0	2,088,469
Riverstone Credit Partners	225,665	13,255	899,208	0	1,138,128
Sculptor Real Estate	428,751	139,391	645,027	0	1,213,169
Shore Capital Partners	0	42,651	0	0	42,651
Shoreline Capital	6,196	0	0	0	6,196
Silchester International Investors Ltd	264,357	0	0	0	264,357
Silver Point Capital	302,893	77,294	1,235,955	0	1,616,142
Stockdale Capital Partners	293,695	140,317	947,376	0	1,381,388
Timberland Investment Resources	344,209	0	0	0	344,209
Torchlight Investors	42,694	29,061	222,210	0	293,965
Tristan Capital Partners	437,915	306,160	(60,907)	0	683,168
Turnbridge Capital Partners	109,376	34,106	0	0	143,482
Varde Asia	169,804	55,051	160,256	0	385,111
Total Manager Expenses	**$20,863,871**	**$ 2,054,529**	**$44,258,057**	**$ 0**	**$67,176,457**
Professional Expenses					
Investment Custodial Fee	$ 69,959	$ 0	$ 0	$ 0	$ 69,959
Performance Management	230,962	0	0	0	230,962
General Consultant (Monitoring) Fee	358,862	0	0	0	358,862
Professional Fees	499,105	0	0	0	499,105
Other Investment Expenses	834,599	0	0	0	834,599
Total Professional Expenses	**$ 1,993,487**	**$ 0**	**$ 0**	**$ 0**	**$ 1,993,487**
Total Investment Expenses	**$22,857,358**	**$ 2,054,529**	**$44,258,057**	**$ 0**	**$69,169,944**

Brokerage Firm	Total Commission	Number of Shares	Commission Rate
THE NORTHERN TRUST COMPANY	$ 35,569	1,559,913	$0.0228
VIRTU AMERICAS, LLC	26,827	1,341,367	0.0200
D. A. DAVIDSON & CO.	23,991	886,861	0.0271
RAYMOND JAMES & ASSOCIATES, INC.	15,496	792,519	0.0196
STIFEL, NICOLAUS & COMPANY, INCORPORATED	12,546	14,275,168	0.0009
PIPER JAFFRAY & CO	11,439	534,113	0.0214
JONESTRADING INSTITUTIONAL SERVICES, LLC	9,320	465,989	0.0200
ROBERT W. BAIRD & CO. INCORPORATED	8,623	747,896	0.0115
CREDIT SUISSE SECURITIES (USA), LLC	7,872	295,649	0.0266
KEEFE BRUYETTE	7,589	431,847	0.0176
MKM PARTNERS, LLC	7,018	349,773	0.0201
INTL FCSTONE FINANCIAL, INC.	6,164	205,482	0.0300
STEPHENS, INC.	3,924	122,519	0.0320
BTIG, LLC	3,250	303,031	0.0107
WELLS FARGO SECURITIES, LLC	2,542	1,782,938	0.0014
MORGAN STANLEY & CO., LLC	2,333	6,853,304	0.0003
B. RILEY AND CO., LLC	1,153	37,041	0.0311
JMP SECURITIES	1,115	46,511	0.0240
CANACCORD GENUITY, INC.	1,020	35,570	0.0287
OTHERS	14,679	3,317,354,862	0.0000
Total	**$202,470**	**3,348,422,353**	
Average Commission Rate			**$0.0001**

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Actuarial Section

800.521.0498 | P: 248.799.9000 | www.grsconsulting.com

September 27, 2022

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

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, 2022. This valuation indicates that contribution rates for the period beginning July 1, 2023 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 5,692 Non-Uniformed employees and 58.00% of payroll for the 1,182 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.

One Towne Square | Suite 800 | Southfield, Michigan 48076-3723

Retirement Board
September 27, 2022
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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 (GASB). 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, 2017 Experience Study and 2021 review of economic assumptions. Gabriel, Roeder, Smith & Company has produced the following reports as of June 30, 2022:

- Annual Actuarial Valuation Report
- GASB Statement 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.

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

Retirement Board
September 27, 2022
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The employer contributions determined in this report are based on the 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.

The annual actuarial valuation report includes risk measures on pages A-13 and A-14, but does not include a more robust assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment. We recommend that the Board consider performing an analysis to assess risk related to investment and payroll.

This report was prepared using our proprietary valuation model and related software which in our professional judgment has the capability to provide results that are consistent with the purposes of the valuation and has no material limitations or known weaknesses. We performed tests to ensure that the model reasonably represents that which is intended to be modeled.

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 actuaries who have substantial experience valuing public employee retirement systems. Heidi G. Barry and Jamal Adora are Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

The signing actuaries 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,
Gabriel, Roeder, Smith & Company

Heidi G. Barry, ASA, FCA, MAAA

Jamal Adora, ASA, EA, MAAA

Valuation Date	June 30, 2022
Actuarial Cost Method	Entry Age
Amortized Method	Closed, level percent-of-payroll
Remaining Amortization Period	11 years*
Asset Valuation Methods	3-year smoothing
Actuarial Assumptions	
Investment Rate of Return	6.50%
Projected Salary Increase	3.00% to 12.45%
Cost-of-Living Adjustments	1.80% Compound
Includes Wage Inflation at	3.00%

**Single equivalent period*

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 2012-2017 study of experience of the MPERS and a 2021 review of economic assumptions. 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, 2022 valuation.

Economic Assumptions

The investment return rate used in making the valuation was 6.50% 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 3.00%, the 6.50% rate translates to an assumed real rate of return over wage inflation of 3.50%. This rate was first used for the **June 30, 2021** valuation.

Pay increase assumptions for individual active members are shown on Table I. Part of the assumption for each year of service is for a merit and/or seniority increase, and the other 3.00% recognizes wage inflation. These rates were first used for the **June 30, 2018** valuation.

Price Inflation is assumed to be 2.25%. This results in a 1.80% annual COLA assumption. It is assumed that the 1.80% COLA will always be paid.

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

The active member payroll for all members is assumed to increase 3.00% annually.

Non-Economic Assumptions

The mortality table used to measure Post-Retirement Healthy Mortality Rates are from the RP-2014 Healthy Annuitant Mortality Tables projected to 2022 using projection scale MP-2017, shown in Table II. Post-Retirement Disabled Mortality Rates use the RP-2014 Disabled Retiree Annuitant Mortality Tables projected to 2022 using projection scale MP-2017, shown in Table III. Pre-Retirement Mortality Rates use the RP-2014 Employee Mortality Tables projected to 2022 using projection scale MP-2017 and multiplied by a factor of 65%, shown in Table IV. These tables were first used for the **June 30, 2018** valuation.

The probabilities of retirement for members eligible to retire are shown on Table VI. The rates for full retirement were first used in the **June 30, 2018** valuation. The rates for reduced retirement were first used in the **June 30, 2018** 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 Table VII. The rates for disability were first used in the **June 30, 2018** valuation.

The probabilities of withdrawal from service, death-in-service and disability are shown for sample ages on Table VIII. The death-in-service and disability rates were first used in the **June 30, 2018** valuation. The withdrawal rates were first used in the **June 30, 2018** 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.

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

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

	MoDOT, Civilian Patrol and MPERS		Uniformed Patrol	
Service	**Male**	**Female**	**Male**	**Female**
0 – 1	30.00%	20.00%	12.00%	12.00%
1 – 2	16.00%	14.00%	6.00%	6.00%
2 – 3	9.00%	11.00%	2.50%	2.50%
3 – 4	7.00%	9.00%	2.50%	2.50%
4 – 5	5.50%	6.00%	2.50%	2.50%

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

	MoDOT, Civilian Patrol and MPERS		Uniformed Patrol	
Age	**Male**	**Female**	**Male**	**Female**
25	5.60%	6.00%	1.89%	1.89%
30	5.60%	6.00%	1.89%	1.89%
35	5.25%	6.00%	1.34%	1.34%
40	4.90%	5.54%	0.79%	0.79%
45	2.80%	4.32%	0.55%	0.55%
50	2.10%	3.00%	0.32%	0.32%
55	1.40%	3.00%	0.16%	0.16%
60	1.40%	3.00%	0.12%	0.12%

Salary Increase Assumptions
Service Based
% Merit Increases in Salaries Next Year

Service Index	MoDOT, Civilian Patrol and MPERS Rate	Uniformed Patrol Rate
1	6.80%	9.45%
2	4.50%	5.00%
3	2.80%	2.75%
4	1.50%	2.50%
5	1.00%	2.00%
6	0.80%	1.50%
7	0.00%	1.25%
8	0.00%	1.25%
9	0.00%	1.00%
10	0.00%	0.75%
11	0.00%	0.75%
12	0.00%	0.75%
13	0.00%	0.50%
14	0.00%	0.50%
15	0.00%	0.25%
16	0.00%	0.25%
17	0.00%	0.25%
18	0.00%	0.25%
19	0.00%	0.25%
20	0.00%	0.25%
21	0.00%	0.00%
22	0.00%	0.00%
23	0.00%	0.00%
24	0.00%	0.00%
25	0.00%	0.00%

Joint Life Retirement Values
(6.50% 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	$157.18	$162.18	0.3922%	0.2660%	32.36	34.85
55	148.88	154.45	0.5582%	0.3734%	28.05	30.34
60	138.85	144.94	0.7938%	0.5667%	23.89	25.97
65	126.89	133.47	1.1511%	0.8398%	19.90	21.76
70	112.78	119.67	1.7034%	1.2770%	16.11	17.74
75	96.54	103.58	2.6823%	2.0723%	12.58	13.97
80	78.84	85.72	4.5024%	3.5553%	9.41	10.56

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.

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

Closed and Year 2000 Plans

	MoDOT, Civilian Patrol and MPERS				Uniformed Patrol	
	Male		Female		Male	Female
Age	Normal	Early	Normal	Early	Normal	
50	40.00%	0.00%	25.00%	0.00%	45.00%	45.00%
55	27.00%	3.00%	32.00%	3.00%	25.00%	25.00%
60	19.00%	5.00%	22.00%	5.00%	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 – 2011 Tier

	MoDOT, Civilian Patrol and MPERS Normal		Uniformed Patrol	
Age	Age & Service	Rule of 90	Early	Normal
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)

	MoDOT, Civilian Patrol and MPERS		Uniformed Patrol	
Age	Male	Female	Male	Female
25	0.08%	0.08%	0.10%	0.10%
30	0.10%	0.10%	0.10%	0.10%
35	0.13%	0.13%	0.10%	0.10%
40	0.17%	0.17%	0.10%	0.10%
45	0.27%	0.27%	0.10%	0.10%
50	0.46%	0.46%	0.10%	0.10%
55	0.86%	0.86%	0.10%	0.10%
60	1.49%	1.49%	0.10%	0.10%

Schedule of Funding Progress

Year Ending June 30	Actuarial Asset Value	Entry Age Accrued Liability	Unfunded Accrued Liability	Funded Ratio	Actuarial Covered Payroll(1)	UAAL as a Percentage of Covered Payroll
2013(2)	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%
2018(2)	2,274,248,122	3,981,838,941	1,707,590,819	57.12%	353,371,000	483.23%
2019	2,415,343,431	4,037,369,708	1,622,026,277	59.82%	362,356,771	447.63%
2020	2,481,329,531	4,092,097,897	1,610,768,366	60.64%	363,572,158	443.04%
2021(2)	2,711,272,503	4,344,072,912	1,632,800,409	62.41%	358,987,667	454.83%
2022	2,925,561,398	4,410,685,047	1,485,123,649	66.33%	366,743,306	404.95%

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

(2) New assumptions and/or methods adopted.

See Note 5 of Notes to the Financial Statements 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	
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%
2018	58.00%	58.00%	4.00%
2019	58.00%	58.00%	4.00%
2020	58.00%	58.00%	4.00%
2021	58.00%	58.00%	4.00%
2022	58.00%	58.00%	4.00%

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

	Non-Uniformed				
	Civilian Patrol	**MoDOT and MPERS**	**Non-Uniformed Total**	**Uniformed Patrol**	**Grand Total**
Active Members					
Closed Plan	178	985	1,163	367	1,530
Year 2000 Plan (Closed)	320	1,341	1,661	352	2,013
Year 2000 Plan – 2011 Tier (Open)	528	2,340	2,868	463	3,331
Total Active Members	1,026	4,666	5,692	1,182	6,874
Total Active Members Prior Year	*1,076*	*4,942*	*6,018*	*1,201*	*7,219*
Retiree – Regular Pensioners					
Closed Plan	486	3,164	3,650	1,061	4,711
Year 2000 Plan (Closed)	670	3,873	4,543	10	4,553
Year 2000 Plan – 2011 Tier (Open)	11	28	39	0	39
Total Regular Pensioners	1,167	7,065	8,232	1,071	9,303
Self Insured Disability Pensioners	2	36	38	3	41
Fully Insured Disability Pensioners	10	69	79	3	82
Terminated Vested Members	273	1,790	2,063	184	2,247
Total	**2,478**	**13,626**	**16,104**	**2,443**	**18,547**
Active Member Valuation Payroll	$49,500,683	$219,521,309	$ 269,021,992	$ 87,640,250	$ 356,662,242
Active Member Valuation Payroll Prior Year	*$49,958,709*	*$218,770,482*	*$ 268,729,191*	*$ 84,465,380*	*$ 353,194,571*
Unfunded Actuarial Accrued Liability	N/A	N/A	$1,032,184,126	$452,939,523	$1,485,123,649

Member data for actuarial valuation is as of May 31, 2022.

MoDOT and MPERS

Closed Plan

	Counted by Complete Years of Service to Valuation Date							Totals	
Attained Age	**0 – 4**	**5 – 9**	**10 – 14**	**15 – 19**	**20 – 24**	**25 – 29**	**30+**	**No.**	**Valuation Payroll**
< 20	0	0	0	0	0	0	0	0	$ 0
20 – 24	0	0	0	0	0	0	0	0	0
25 – 29	0	0	0	0	0	0	0	0	0
30 – 34	0	0	0	0	0	0	0	0	0
35 – 39	0	0	0	0	0	0	0	0	0
40 – 44	0	0	2	1	47	1	0	51	2,514,462
45 – 49	0	0	0	0	125	80	0	205	12,109,259
50 – 54	0	2	4	5	94	212	45	362	21,735,845
55 – 59	1	0	5	3	60	81	84	234	13,547,463
60 – 64	1	0	1	0	29	39	40	110	6,327,609
65 – 69	0	0	0	0	6	9	5	20	1,173,838
70+	0	0	0	0	0	0	3	3	278,745
Totals	**2**	**2**	**12**	**9**	**361**	**422**	**177**	**985**	**$ 57,687,221**

Average Age	**53.1 years**
Average Service	**26.7 years**
Average Pay	**$58,566**

Year 2000 Plan

	Counted by Complete Years of Service to Valuation Date							Totals	
Attained Age	**0 – 4**	**5 – 9**	**10 – 14**	**15 – 19**	**20 – 24**	**25 – 29**	**30+**	**No.**	**Valuation Payroll**
< 20	0	0	0	0	0	0	0	0	$ 0
20 – 24	0	0	0	0	0	0	0	0	0
25 – 29	0	0	0	0	0	0	0	0	0
30 – 34	0	3	13	2	0	0	0	18	820,317
35 – 39	4	10	78	84	1	0	0	177	8,658,340
40 – 44	8	10	49	156	59	0	0	282	14,686,773
45 – 49	6	7	63	104	77	0	0	257	13,036,431
50 – 54	13	10	58	93	48	0	0	222	10,629,858
55 – 59	8	5	39	90	57	0	0	199	9,350,875
60 – 64	2	6	39	70	28	1	0	146	6,593,627
65 – 69	0	1	13	17	6	0	0	37	1,706,726
70+	0	0	0	2	1	0	0	3	130,432
Totals	**41**	**52**	**352**	**618**	**277**	**1**	**0**	**1,341**	**$ 65,613,379**

Average Age	**49.0 years**
Average Service	**16.3 years**
Average Pay	**$48,929**

Member data for actuarial valuation is as of May 31, 2022.

MoDOT and MPERS

Year 2000 Plan – 2011 Tier

	Counted by Complete Years of Service to Valuation Date							Totals	
Attained Age	0 – 4	5 – 9	10 – 14	15 – 19	20 – 24	25 – 29	30+	No.	Valuation Payroll
< 20	9	0	0	0	0	0	0	9	$ 307,834
20 – 24	171	0	0	0	0	0	0	171	6,073,453
25 – 29	330	90	0	0	0	0	0	420	17,697,072
30 – 34	223	178	3	0	0	0	0	404	17,357,308
35 – 39	180	141	8	0	0	0	0	329	13,810,154
40 – 44	157	106	3	0	0	0	0	266	11,082,656
45 – 49	132	78	0	0	0	0	0	210	8,427,129
50 – 54	120	89	5	0	0	0	0	214	8,624,766
55 – 59	89	80	3	0	1	0	0	173	7,104,767
60 – 64	46	73	1	0	0	0	0	120	4,784,738
65 – 69	13	8	0	0	0	0	0	21	841,327
70+	2	1	0	0	0	0	0	3	109,505
Totals	**1,472**	**844**	**23**	**0**	**1**	**0**	**0**	**2,340**	**$ 96,220,709**

Average Age	**39.1 years**
Average Service	**4.2 years**
Average Pay	**$41,120**

Member data for actuarial valuation is as of May 31, 2022.

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
< 20	0	0	0	0	0	0	0	0	$ 0
20 – 24	0	0	0	0	0	0	0	0	0
25 – 29	0	0	0	0	0	0	0	0	0
30 – 34	0	0	0	0	0	0	0	0	0
35 – 39	0	0	0	0	0	0	0	0	0
40 – 44	0	0	1	0	8	0	0	9	755,304
45 – 49	0	0	0	0	43	50	1	94	8,144,639
50 – 54	1	0	0	1	23	153	20	198	17,392,686
55 – 59	0	0	0	0	2	30	29	61	5,405,271
60 – 64	0	0	0	0	0	2	3	5	454,518
65 – 69	0	0	0	0	0	0	0	0	0
70+	0	0	0	0	0	0	0	0	0
Totals	**1**	**0**	**1**	**1**	**76**	**235**	**53**	**367**	**$ 32,152,418**

Average Age	**51.4 years**
Average Service	**27.0 years**
Average Pay	**$87,609**

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
< 20	0	0	0	0	0	0	0	0	$ 0
20 – 24	0	0	0	0	0	0	0	0	0
25 – 29	0	0	0	0	0	0	0	0	0
30 – 34	0	1	8	0	0	0	0	9	642,568
35 – 39	0	0	75	30	0	0	0	105	7,780,376
40 – 44	1	0	24	86	13	0	0	124	10,060,136
45 – 49	0	0	8	46	29	0	0	83	6,816,321
50 – 54	0	0	4	12	7	1	0	24	1,891,515
55 – 59	0	0	2	3	2	0	0	7	530,562
60 – 64	0	0	0	0	0	0	0	0	0
65 – 69	0	0	0	0	0	0	0	0	0
70+	0	0	0	0	0	0	0	0	0
Totals	**1**	**1**	**121**	**177**	**51**	**1**	**0**	**352**	**$ 27,721,478**

Average Age	**42.3 years**
Average Service	**16.7 years**
Average Pay	**$78,754**

Member data for actuarial valuation is as of May 31, 2022.

Uniformed Patrol

Year 2000 Plan – 2011 Tier

Attained Age	Counted by Complete Years of Service to Valuation Date 0 – 4	5 – 9	10 – 14	15 – 19	20 – 24	25 – 29	30+	Totals No.	Valuation Payroll
< 20	0	0	0	0	0	0	0	0	$ 0
20 – 24	53	0	0	0	0	0	0	53	3,233,498
25 – 29	114	34	0	0	0	0	0	148	8,564,833
30 – 34	47	100	18	0	0	0	0	165	9,973,303
35 – 39	13	33	24	0	0	0	0	70	4,337,354
40 – 44	0	9	7	0	0	0	0	16	991,890
45 – 49	0	3	3	0	0	0	0	6	373,370
50 – 54	1	1	2	0	0	0	0	4	231,183
55 – 59	0	1	0	0	0	0	0	1	60,922
60 – 64	0	0	0	0	0	0	0	0	0
65 – 69	0	0	0	0	0	0	0	0	0
70+	0	0	0	0	0	0	0	0	0
Totals	**228**	**181**	**54**	**0**	**0**	**0**	**0**	**463**	**$ 27,766,353**

Average Age	**30.7 years**
Average Service	**5.4 years**
Average Pay	**$59,971**

Member data for actuarial valuation is as of May 31, 2022.

Civilian Patrol

Closed Plan

Attained Age	Counted by Complete Years of Service to Valuation Date 0 – 4	5 – 9	10 – 14	15 – 19	20 – 24	25 – 29	30+	Totals No.	Valuation Payroll
< 20	0	0	0	0	0	0	0	0	$ 0
20 – 24	0	0	0	0	0	0	0	0	0
25 – 29	0	0	0	0	0	0	0	0	0
30 – 34	0	0	0	0	0	0	0	0	0
35 – 39	0	0	0	0	0	0	0	0	0
40 – 44	0	1	0	0	6	2	0	9	413,897
45 – 49	0	0	0	0	16	20	0	36	2,109,767
50 – 54	0	0	4	0	16	26	11	57	3,264,911
55 – 59	1	0	3	1	12	18	14	49	2,753,125
60 – 64	0	0	1	0	9	8	4	22	1,088,452
65 – 69	0	0	0	0	1	2	1	4	236,636
70+	0	0	0	0	0	0	1	1	38,894
Totals	**1**	**1**	**8**	**1**	**60**	**76**	**31**	**178**	**$ 9,905,682**

Average Age	**53.7 years**
Average Service	**26.1 years**
Average Pay	**$55,650**

Year 2000 Plan

Attained Age	Counted by Complete Years of Service to Valuation Date 0 – 4	5 – 9	10 – 14	15 – 19	20 – 24	25 – 29	30+	Totals No.	Valuation Payroll
< 20	0	0	0	0	0	0	0	0	$ 0
20 – 24	0	0	0	0	0	0	0	0	0
25 – 29	0	0	0	0	0	0	0	0	0
30 – 34	1	3	4	0	0	0	0	8	308,631
35 – 39	0	1	28	10	0	0	0	39	2,164,719
40 – 44	0	6	18	52	13	0	0	89	5,235,150
45 – 49	1	1	12	20	14	0	0	48	2,608,571
50 – 54	1	3	12	27	12	0	0	55	2,713,588
55 – 59	4	0	12	24	10	0	0	50	2,560,316
60 – 64	1	0	8	9	5	0	0	23	1,128,521
65 – 69	0	0	4	2	1	0	0	7	283,608
70+	0	0	0	1	0	0	0	1	34,850
Totals	**8**	**14**	**98**	**145**	**55**	**0**	**0**	**320**	**$ 17,037,954**

Average Age	**48.2 years**
Average Service	**16.0 years**
Average Pay	**$53,244**

Member data for actuarial valuation is as of May 31, 2022.

Civilian Patrol

Year 2000 Plan – 2011 Tier

Attained Age	Counted by Complete Years of Service to Valuation Date 0 – 4	5 – 9	10 – 14	15 – 19	20 – 24	25 – 29	30+	Totals No.	Valuation Payroll
< 20	1	0	0	0	0	0	0	1	$ 29,070
20 – 24	26	0	0	0	0	0	0	26	956,856
25 – 29	73	24	0	0	0	0	0	97	4,318,584
30 – 34	45	50	4	0	0	0	0	99	4,736,026
35 – 39	24	30	11	0	0	0	0	65	2,953,571
40 – 44	23	23	5	0	0	0	0	51	2,179,373
45 – 49	20	22	3	0	0	0	0	45	1,838,574
50 – 54	26	24	4	0	0	0	0	54	2,144,110
55 – 59	25	18	5	0	0	0	0	48	1,886,931
60 – 64	15	14	1	0	0	0	0	30	1,071,224
65 – 69	1	9	1	0	0	0	0	11	396,838
70+	0	0	1	0	0	0	0	1	45,890
Totals	**279**	**214**	**35**	**0**	**0**	**0**	**0**	**528**	**$ 22,557,047**

Average Age	**40.3 years**
Average Service	**4.9 years**
Average Pay	**$42,722**

Member data for actuarial valuation is as of May 31, 2022.

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
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
2018	3	7,391	351,496,555	47,557	1.6
2019	3	7,421	359,296,056	48,416	1.8
2020	3	7,355	360,851,545	49,062	1.3
2021	3	7,219	355,194,571	49,203	0.3
2022	3	6,874	356,662,243	51,886	5.5
				Ten-Year Average	**1.6%**

Member data for actuarial valuation is as of May 31, 2022.

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			
	Millions				(1)	(2)	(3)	Total
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%
2018*	11	2,598	1,373	2,274	100%	87%	0%	57%
2019	14	2,656	1,367	2,415	100%	90%	0%	60%
2020	18	2,726	1,348	2,481	100%	90%	0%	61%
2021*	21	2,882	1,441	2,711	100%	93%	0%	62%
2022	21	2,882	1,441	2,711	100%	93%	0%	62%

**New Assumptions and/or methods.*

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.

UUAL Beginning of Year (at July 1)	$1,632,800,409
Normal Cost	52,804,762
Transfer In and Service Purchase – Liability	6,756,046
Contributions	(225,366,897)
Interest	100,743,328
Net Change in LTD Assets	0
Expected UAAL Before Any Changes	1,567,737,648
Effect of Benefit Changes	0
Effect of Changes of Assumptions and Methods	0
Effect of Adjustment	0
Expected UAAL After Changes	1,567,737,648
End of Year UAAL (at June 30)	1,485,123,649
Gain/(Loss) for Year	$ 82,613,999
Gain/(Loss) as a percent of actuarial accrued liabilities at start of year ($4,344.1million)	1.9%

**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
2013	2.1%
2014	2.1%
2015	2.4%
2016	1.1%
2017	0.1%
2018	0.6%
2019	0.7%
2020	(1.2)%
2021	3.6%
2022	1.9%

Valuation Date	Added to Rolls Number	Added to Rolls Annual Allowances	Removed from Rolls Number	Removed from Rolls Annual Allowances	Rolls End of Year Number	Rolls End of Year Annual Allowances	Average Annual Allowances	% Increase Annual Allowance	% Increase Average Annual Allowance
FY2022									
Retirees	430	$5,592,522	240	$4,287,730	7,444	$209,268,115	$28,112	1.67%	-0.93%
Beneficiaries	136	1,815,705	127	1,537,452	1,918	40,367,666	21,047	4.03%	3.55%
Disabilities	18	0	22	12,610	124	822,885	6,745	-2.42%	2.38%
FY2021									
Retirees	335	$4,388,320	289	$4,630,165	7,256	$205,830,949	$28,375	1.21%	0.57%
Beneficiaries	161	2,092,581	131	1,421,420	1,909	38,802,739	20,326	4.31%	2.67%
Disabilities	14	0	25	6,652	128	843,262	6,588	0.46%	9.09%
FY2020									
Retirees	339	$ 4,389,004	204	$ 360,775	7,208	$203,365,258	$28,214	2.39%	0.53%
Beneficiaries	129	1,441,941	122	1,316,530	1,879	37,200,605	19,798	3.35%	2.64%
Disabilities	7	0	26	750	139	839,398	6,039	-1.93%	0.89%
FY2019									
Retirees	308	$4,104,217	187	$2,746,320	7,077	$198,618,027	$28,065	2.54%	0.78%
Beneficiaries	133	1,424,022	124	1,211,576	1,866	35,993,556	19,289	3.04%	2.87%
Disabilities	22	0	25	31,787	143	855,947	5,986	1.26%	4.80%
FY2018									
Retirees	311	$3,842,195	196	$2,780,558	6,956	$193,705,411	$27,847	1.96%	0.34%
Beneficiaries	112	1,103,494	134	855,794	1,863	34,930,984	18,750	1.97%	2.62%
Disabilities	18	0	24	26,921	148	845,327	5,712	-2.82%	2.44%
FY2017									
Retirees	352	$4,642,501	193	$3,023,457	6,846	$189,990,373	$27,752	1.29%	-1.02%
Beneficiaries	127	1,536,955	121	1,099,249	1,875	34,257,599	18,271	3.49%	3.88%
Disabilities	24	0	29	15,898	155	869,833	5,576	-3.92%	-4.54%
FY2016									
Retirees	300	$3,820,071	188	$3,032,208	6,690	$187,571,039	$28,038	2.31%	0.68%
Beneficiaries	129	1,205,294	139	889,494	1,882	33,100,896	17,588	3.18%	2.74%
Disabilities	20	0	30	5,787	155	905,306	5,841	0.21%	6.05%
FY2015									
Retirees	406	$4,669,565	176	$2,712,395	6,583	$183,337,549	$27,750	2.61%	-0.79%
Beneficiaries	113	1,290,336	126	900,991	1,874	32,080,172	17,119	2.65%	4.07%
Disabilities	21	0	25	22,387	164	903,386	5,508	-3.43%	1.87%
FY2014									
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%
FY2013									
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	14,966	6.79%	5.00%
Disabilities	27	0	23	6,788	179	904,683	5,239	-1.88%	-3.00%

New disabilities are covered/paid by The Standard Insurance Co.
Data of this chart is as of June 30, 2022.

Comparison of the Closed Plan, the Year 2000 Plan, and the Year 2000 Plan – 2011 Tier

For the Year Ended June 30, 2022

Plan Provision	Closed Plan	Year 2000 Plan	Year 2000 Plan - 2011 Tier
Membership Eligibility	• 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.	• 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. • 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.	• 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.
Normal Retirement Eligibility	• Age 65 & active with 4 years of service. • Age 65 with 5 years of service. • Age 60 with 15 years of service. • "Rule of 80"/minimum age 48. <u>Uniformed Members Only:</u> • Age 55 & active with 4 years of service. • Age 55 with 5 years of service. • Mandatory retirement at age 60; no minimum service requirement (active only).	• Age 62 with 5 years of service. • "Rule of 80" / minimum age 48 (active only). <u>Uniformed Members Only:</u> • Mandatory retirement at age 60; no minimum service requirement (active only).	• Age 67 with 5 years of service. • "Rule of 90" / minimum age 55 (active only). <u>Uniformed Members Only:</u> • Age 55 & active with 5 years of service (active only). • Mandatory retirement at age 60; no minimum service requirement (active only).
Early (Reduced) Retirement Eligibility	• Age 55 with 10 years of creditable service.	• Age 57 with 5 years of creditable service.	• Age 62 with 5 years of creditable service (active only).
Life Benefit	1.6% x FAP** x service (base benefit is increased by 33⅓% 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 • Available to active employees or LTD recipients who retired after September 28, 1985. • Available to work-related disability recipients after September 28, 1985.	$5,000 benefit paid to named beneficiary • Available to active employees or LTD recipients who retire. • Available to work-related disability recipients.	$5,000 benefit paid to named beneficiary • Available to active employees or LTD recipients who retire. • Available to work-related disability recipients.

Comparison of the Closed Plan, the Year 2000 Plan, and the Year 2000 Plan – 2011 Tier

For the Year Ended June 30, 2022 (continued)

Plan Provision	Closed Plan	Year 2000 Plan	Year 2000 Plan - 2011 Tier
Vesting	5 years of service.	5 years of service.	5 years of service, if active on or after January 1, 2018.
Cost-of-Living Allowance (COLA)	Annual COLA is equal to 80% of the change in the CPI-U with a maximum rate of 5%. <u>Exception:</u> If hired before August 28, 1997, annual COLA is a minimum of 4% until benefit increases reach 65% of the original benefit (cap). After 65% cap is reached, annual COLA will be equal to 80% of the change in the CPI-U, with a maximum rate of 5%.	Annual COLA is equal to 80% of the change in the CPI-U with a maximum rate of 5%.	Annual COLA is equal to 80% of the change in the CPI-U with a maximum rate of 5%.
Survivor Benefit (death before retirement) Non Duty-Related Death	If employee is vested: • Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children under age 21. • 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.	If employee is vested: • Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children under age 21.	If employee is vested: • Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children under age 21.
Duty-Related Death	• Survivor benefit to eligible spouse or children no less than 50% of final average pay (no minimum service requirement).	• Survivor benefit to eligible spouse or children no less than 50% of final average pay (no minimum service requirement).	• Survivor benefit to eligible spouse or children no less than 50% of final average pay (no minimum service requirement).
Optional Forms of Payment	Payment options include: • Life income annuity • Unreduced joint & 50% survivor • Joint & 100% survivor • 60 or 120 guaranteed payments • BackDROP	Payment options include: • Life income annuity • Joint & 50% survivor • Joint & 100% survivor • 120 or 180 guaranteed payments • BackDROP	Payment options include: • Life income annuity • Joint & 50% survivor • Joint & 100% survivor • 120 or 180 guaranteed payments
Disability	Long-term disability and work-related disability.	Long-term disability and work-related disability.	Long-term disability and work-related disability.
Employee Contributions	Non-contributory.	Non-contributory.	4% of gross pay.

**This summary describes the plan provisions in chapter 104 of the Missouri Revised Statutes. It does not overrule any other applicable statue or administrative rule and, in the event of a conflict, the applicable statue 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.

During the 2022 legislative session, no MPERS related bills were signed into law.

Statistical Section

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Financial Information
The chart on page 82 details a 10-year history of the additions (revenues) and deductions (expenses) of MPERS.

The chart on page 83 details a 10-year history of benefit payments by type.

Plan Membership
Overall, MPERS' membership decreased by 40. Retired members and their beneficiaries increased by 195, terminated-vested members increased by 103, and active members decreased by 338.

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

Sources: All non-accounting data in this section was derived from internal sources as of June 30, and the annual actuarial valuation reports. Member data may differ between some schedules because the valuations are performed using data as of May 31 each year.

MoDOT and Patrol Employee's Retirement System
Changes in Net Position, Last Ten Fiscal Years

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Additions										
Employer Contributions	$170,836,117	$183,353,841	$200,638,571	$199,609,396	$206,562,924	$204,955,180	$210,166,927	$210,871,852	$208,212,848	$212,711,117
Employee Contributions	503,550	1,282,379	2,086,000	2,503,824	3,238,502	3,721,983	4,449,428	4,983,989	5,334,102	5,899,734
Transfers from Other System	1,727,834	1,784,382	1,114,437	2,729,679	1,752,050	1,867,445	2,432,370	3,483,574	2,080,317	4,334,202
Other Contributions	635,900	978,184	1,208,162	978,689	1,645,487	1,279,434	1,546,916	1,563,362	1,761,860	2,421,844
Net Investment Income	198,139,438	319,445,655	92,645,423	21,432,090	220,301,127	197,619,367	154,326,511	(10,673,270)	699,644,251	122,767,485
Other Income	1,650	125	148	5	614	472	307	5,412	286	195
Total Additions to Fiduciary Net Position	371,844,489	506,844,566	297,692,741	227,253,683	433,500,704	409,443,881	372,922,459	210,234,919	917,033,664	348,134,577
Deductions										
Benefit Payments	224,518,100	231,384,708	241,714,876	240,176,011	251,284,152	259,058,863	259,817,811	267,605,833	270,122,851	279,637,701
Administrative Expenses	2,997,225	3,736,355	4,066,944	4,370,860	4,515,458	4,693,492	4,372,966	4,291,028	4,585,473	5,229,018
Total Deductions from Fiduciary Net Position	227,515,325	235,121,063	245,781,820	244,546,871	255,799,610	263,752,355	264,190,777	271,896,861	274,708,324	284,866,719
Change in Net Position	**$144,329,164**	**$271,723,503**	**$ 51,910,921**	**$(17,293,188)**	**$177,701,094**	**$145,691,526**	**$108,731,682**	**$(61,661,942)**	**$642,325,340**	**$ 63,267,858**

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

Type of Benefit	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Age and Service Benefits:										
Retiree and Survivor Annuity Payments	$205,617,640	$212,840,210	$218,827,986	$224,098,038	$227,997,513	$237,850,981	$238,205,549	$245,194,376	$250,420,018	$254,733,514
BackDROP Payments	13,426,923	13,438,730	16,366,338	10,677,166	16,887,349	14,546,108	15,424,880	15,787,033	13,585,357	17,688,088
Disability Benefits:										
Long-Term Disability	79,964	79,184	76,061	66,389	60,352	49,613	35,987	26,488	21,023	14,370
Work-Related Disability	691,227	774,541	716,047	718,009	707,953	714,197	711,990	698,794	710,841	719,345
Normal Disability	138,281	121,872	108,891	109,027	109,455	110,310	112,000	114,119	115,952	100,068
Insured Disability	1,512,685	1,531,578	1,554,676	1,567,825	1,620,418	1,601,605	1,615,860	1,640,971	1,600,628	1,470,000
Death Benefits	665,000	703,571	810,000	820,000	855,153	860,000	820,000	890,000	1,255,000	1,130,000
Service Transfer Payments (1)	2,357,080	1,876,336	3,147,482	1,921,451	2,724,631	2,823,042	2,111,007	2,457,945	1,802,900	2,757,330
Employee Contribution Refunds	29,300	18,686	107,395	198,106	321,328	503,007	780,538	796,107	611,132	1,024,986
Total Benefits	**$224,518,100**	**$231,384,708**	**$241,714,876**	**$240,176,011**	**$251,284,152**	**$259,058,863**	**$259,817,811**	**$267,605,833**	**$270,122,851**	**$279,637,701**

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

MoDOT and Patrol Employees' Retirement System
Budget to Actual Report

As of June 30, 2022

	Annual Budget	Actual Year End	Actual % Spent	Budget Variance Favorable / (Unfavorable)
Administrative Expenses				
Salary/Benefits	$2,141,995	$2,099,306	98.0%	$ 42,689
Professional Services	345,700	332,734	96.3%	12,966
Meetings/Travel/Education	40,800	32,112	78.7%	8,688
Member Education	15,780	1,415	9.0%	14,365
Office Supplies	6,000	3,392	56.5%	2,608
Printing/Postage	29,900	22,187	74.2%	7,713
Membership Dues/Subscriptions	24,383	26,169	107.3%	(1,786)
Utilities	36,460	33,105	90.8%	3,355
Building Expense/Maintenance	42,710	35,232	82.5%	7,478
Rental/Lease	9,555	9,871	103.3%	(316)
Equipment/Furniture	8,400	9,404	112.0%	(1,004)
Information Technology	316,423	339,552	107.3%	(23,129)
Total Administrative Expenses	$3,018,106	$2,944,479	97.6%	$ 73,627
Investment Expenses				
Salary/Benefits	$2,059,357	$2,024,513	98.3%	$ 34,844
Investment Services	656,022	686,289	104.6%	(30,267)
Meetings/Travel/Education	58,350	18,395	31.5%	39,955
Direct Operating Expenses	45,770	52,553	114.8%	(6,783)
Total Investment Expenses	$2,819,499	$2,781,750	98.7%	$ 37,749
TOTALS	**$5,837,605**	**$5,726,229**	**98.1%**	**$111,376**

Reconciliation to Statement of Changes in Fiduciary Net Position, Administrative Expenses:

Total Administrative Expenses	$5,229,018
Investment General Consultant	358,862
Investment Custodian	300,921
Actuarial Experience Study	(9,000)
Depreciation Expense	(23,328)
OPEB Expense	(159,911)
OPEB Deferred Outflow	29,667
Capitalized Equipment Costs	0
	$5,726,229

All Members*

Amount of Monthly Benefit	Type of Benefit: Retirement Normal	Retirement Early	Disability Normal	Disability Work-Related	Disability Long-Term	Survivor	Total Recipients
1 – 200	34	93	2	28	55	68	280
201 – 400	194	250	2	0	2	139	587
401 – 600	202	167	1	0	2	144	516
601 – 800	213	137	0	0	0	148	498
801 – 1,000	176	67	4	1	0	150	398
1,001 – 1,200	288	38	0	1	0	137	464
1,201 – 1,400	310	30	1	1	0	133	475
1,401 – 1,600	413	12	0	2	0	125	552
1,601 – 1,800	468	9	1	0	0	100	578
1,801 – 2,000	509	3	0	5	0	112	629
2,001 – 2,200	515	4	0	3	0	74	596
2,201 – 2,400	400	2	0	3	0	69	474
2,401 – 2,600	315	0	0	3	0	68	386
2,601 – 2,800	287	0	0	1	0	57	345
2,801 – 3,000	220	2	0	1	0	52	275
> 3,000	2,084	2	0	5	0	342	2,433
TOTALS	**6,628**	**816**	**11**	**54**	**59**	**1,918**	**9,486**

**This chart includes ten retirement system staff retirees.*

MoDOT

Amount of Monthly Benefit	Type of Benefit: Retirement Normal	Retirement Early	Disability Normal	Disability Work-Related	Disability Long-Term	Survivor	Total Recipients
1 – 200	27	68	2	24	44	62	227
201 – 400	139	208	2	0	2	119	470
401 – 600	147	130	1	0	1	123	402
601 – 800	156	120	0	0	0	131	407
801 – 1,000	121	60	4	1	0	124	310
1,001 – 1,200	219	34	0	1	0	121	375
1,201 – 1,400	254	20	1	1	0	123	399
1,401 – 1,600	328	11	0	2	0	109	450
1,601 – 1,800	389	8	1	0	0	83	481
1,801 – 2,000	437	3	0	5	0	99	544
2,001 – 2,200	445	4	0	3	0	60	512
2,201 – 2,400	347	2	0	2	0	55	406
2,401 – 2,600	276	0	0	1	0	51	328
2,601 – 2,800	240	0	0	1	0	36	277
2,801 – 3,000	190	2	0	1	0	32	225
> 3,000	1,154	1	0	4	0	225	1,384
TOTALS	**4,869**	**671**	**11**	**46**	**47**	**1,553**	**7,197**

Uniformed Patrol

Amount of Monthly Benefit	Type of Benefit: Retirement Normal	Retirement Early	Disability Normal	Disability Work-Related	Disability Long-Term	Survivor	Total Recipients
1 – 200	0	0	0	2	2	0	4
201 – 400	8	1	0	0	0	4	13
401 – 600	11	0	0	0	0	6	17
601 – 800	19	0	0	0	0	2	21
801 – 1,000	13	0	0	0	0	3	16
1,001 – 1,200	11	0	0	0	0	6	17
1,201 – 1,400	5	0	0	0	0	0	5
1,401 – 1,600	3	0	0	0	0	4	7
1,601 – 1,800	3	0	0	0	0	8	11
1,801 – 2,000	4	0	0	0	0	4	8
2,001 – 2,200	2	0	0	0	0	8	10
2,201 – 2,400	3	0	0	1	0	9	13
2,401 – 2,600	3	0	0	1	0	13	17
2,601 – 2,800	3	0	0	0	0	17	20
2,801 – 3,000	3	0	0	0	0	18	21
> 3,000	779	0	0	1	0	111	891
TOTALS	**870**	**1**	**0**	**5**	**2**	**213**	**1,091**

Civilian Patrol

Amount of Monthly Benefit	Type of Benefit: Retirement Normal	Retirement Early	Disability Normal	Disability Work-Related	Disability Long-Term	Survivor	Total Recipients
1 – 200	7	25	0	2	9	6	49
201 – 400	47	41	0	0	0	16	104
401 – 600	44	37	0	0	1	15	97
601 – 800	38	17	0	0	0	15	70
801 – 1,000	42	7	0	0	0	23	72
1,001 – 1,200	58	4	0	0	0	10	72
1,201 – 1,400	51	10	0	0	0	10	71
1,401 – 1,600	81	1	0	0	0	12	94
1,601 – 1,800	76	1	0	0	0	9	86
1,801 – 2,000	68	0	0	0	0	9	77
2,001 – 2,200	67	0	0	0	0	6	73
2,201 – 2,400	50	0	0	0	0	5	55
2,401 – 2,600	36	0	0	1	0	4	41
2,601 – 2,800	43	0	0	0	0	4	47
2,801 – 3,000	27	0	0	0	0	2	29
> 3,000	145	0	0	0	0	6	151
TOTALS	**880**	**143**	**0**	**3**	**10**	**152**	**1,188**

MoDOT

By Years of Service

Retired In Fiscal Year		0 – 10	11 – 15	16 – 20	21 – 25	26 – 30	31 – 35	36 – 40	41+
2013	Average Benefit	$ 331	$ 675	$1,457	$1,918	$2,840	$2,962	$5,865	$3,036
2013	Average FAP	$2,691	$3,010	$3,485	$3,831	$4,335	$3,985	$5,516	$2,802
2013	Current Retirees	32	29	39	62	98	26	2	1
2014	Average Benefit	$ 327	$ 811	$1,366	$1,781	$2,919	$3,355	$3,232	$ 0
2014	Average FAP	$2,429	$3,171	$3,493	$3,874	$4,509	$4,606	$3,781	$ 0
2014	Current Retirees	26	21	19	40	75	14	2	0
2015	Average Benefit	$ 345	$ 682	$1,297	$1,781	$3,016	$3,681	$3,468	$ 0
2015	Average FAP	$2,660	$3,042	$3,395	$3,607	$4,324	$4,659	$4,286	$ 0
2015	Current Retirees	48	57	35	47	75	19	2	0
2016	Average Benefit	$ 339	$ 570	$ 955	$1,855	$3,063	$3,560	$4,628	$ 0
2016	Average FAP	$2,828	$2,710	$2,873	$3,754	$4,325	$4,709	$5,147	$ 0
2016	Current Retirees	30	23	23	45	80	13	2	0
2017	Average Benefit	$ 359	$ 600	$1,038	$1,792	$3,157	$3,983	$2,823	$ 0
2017	Average FAP	$2,568	$2,773	$3,087	$3,616	$4,639	$4,801	$3,717	$ 0
2017	Current Retirees	38	29	28	54	83	12	3	0
2018	Average Benefit	$ 331	$ 637	$1,076	$2,014	$3,143	$4,066	$3,279	$ 0
2018	Average FAP	$2,565	$3,009	$3,423	$3,956	$4,559	$4,957	$3,909	$ 0
2018	Current Retirees	30	33	37	47	69	10	1	0
2019	Average Benefit	$ 336	$ 688	$1,049	$1,872	$3,116	$3,501	$3,328	$ 0
2019	Average FAP	$2,617	$3,037	$3,444	$3,879	$4,704	$4,594	$4,015	$ 0
2019	Current Retirees	33	22	37	46	64	14	4	0
2020	Average Benefit	$ 339	$ 614	$1,163	$1,864	$3,129	$3,757	$3,389	$5,122
2020	Average FAP	$2,715	$3,118	$3,470	$3,797	$4,641	$4,890	$5,237	$5,540
2020	Current Retirees	28	26	33	59	88	7	3	2
2021	Average Benefit	$ 304	$ 755	$1,244	$1,829	$2,890	$3,284	$3,116	$2,998
2021	Average FAP	$2,881	$3,158	$3,453	$3,790	$4,342	$4,624	$4,677	$3,460
2021	Current Retirees	30	18	47	66	58	13	3	1
2022	Average Benefit	$ 301	$ 695	$1,148	$1,807	$2,943	$3,200	$3,001	$3,103
2022	Average FAP	$2,769	$3,405	$3,602	$3,770	$4,486	$4,622	$4,108	$3,993
2022	Current Retirees	45	38	48	72	73	16	3	2

FAP = Final Average Pay

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+
2013	Average Benefit	$ 660	$ 0	$1,977	$5,023	$5,907	$6,986	$9,483	$ 0
2013	Average FAP	$1,972	$ 0	$3,917	$6,507	$6,419	$6,505	$7,510	$ 0
2013	Current Retirees	2	0	2	2	8	8	1	0
2014	Average Benefit	$ 570	$ 0	$ 0	$ 0	$6,026	$7,238	$ 0	$ 0
2014	Average FAP	$2,503	$ 0	$ 0	$ 0	$6,528	$6,649	$ 0	$ 0
2014	Current Retirees	5	0	0	0	24	10	0	0
2015	Average Benefit	$ 890	$ 979	$ 0	$4,475	$6,027	$7,391	$ 0	$ 0
2015	Average FAP	$3,119	$4,458	$ 0	$6,170	$6,680	$6,951	$ 0	$ 0
2015	Current Retirees	1	1	0	1	19	10	0	0
2016	Average Benefit	$ 314	$1,258	$ 0	$4,643	$5,523	$7,093	$ 0	$ 0
2016	Average FAP	$2,599	$3,804	$ 0	$6,405	$6,559	$7,039	$ 0	$ 0
2016	Current Retirees	1	1	0	4	12	4	0	0
2017	Average Benefit	$ 624	$1,205	$3,347	$4,601	$5,547	$8,748	$8,061	$ 0
2017	Average FAP	$2,791	$3,804	$5,548	$5,621	$6,786	$7,841	$7,077	$ 0
2017	Current Retirees	2	2	1	1	29	1	1	0
2018	Average Benefit	$ 434	$1,160	$1,673	$4,188	$5,390	$ 0	$ 0	$ 0
2018	Average FAP	$2,566	$3,430	$3,943	$7,001	$6,771	$ 0	$ 0	$ 0
2018	Current Retirees	2	3	1	4	25	0	0	0
2019	Average Benefit	$ 387	$1,166	$2,017	$3,627	$5,156	$6,505	$ 0	$ 0
2019	Average FAP	$2,748	$3,589	$4,417	$6,051	$6,930	$7,472	$ 0	$ 0
2019	Current Retirees	3	1	2	4	33	6	0	0
2020	Average Benefit	$ 578	$ 814	$2,414	$3,648	$4,993	$6,006	$ 0	$ 0
2020	Average FAP	$3,004	$3,047	$5,530	$6,246	$6,906	$6,915	$ 0	$ 0
2020	Current Retirees	5	1	3	5	26	4	0	0
2021	Average Benefit	$ 551	$ 0	$ 0	$3,262	$4,868	$5,784	$ 0	$ 0
2021	Average FAP	$3,261	$ 0	$ 0	$6,136	$6,984	$7,164	$ 0	$ 0
2021	Current Retirees	8	0	0	5	30	6	0	0
2022	Average Benefit	$ 609	$ 895	$2,389	$3,757	$4,553	$5,345	$ 0	$ 0
2022	Average FAP	$3,277	$3,602	$5,407	$6,684	$6,918	$6,980	$ 0	$ 0
2022	Current Retirees	4	3	1	5	43	3	0	0

FAP = Final Average Pay

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+
2013	Average Benefit	$ 352	$ 591	$1,238	$1,694	$1,943	$3,400	$ 0	$ 0
2013	Average FAP	$2,723	$2,556	$2,888	$3,148	$3,530	$4,003	$ 0	$ 0
2013	Current Retirees	13	8	7	8	8	6	0	0
2014	Average Benefit	$ 330	$ 622	$1,283	$1,509	$2,312	$3,657	$ 0	$ 0
2014	Average FAP	$2,319	$2,830	$3,165	$3,453	$3,831	$4,911	$ 0	$ 0
2014	Current Retirees	9	11	6	13	12	6	0	0
2015	Average Benefit	$ 326	$ 659	$1,283	$1,509	$2,312	$3,657	$ 0	$ 0
2015	Average FAP	$2,335	$2,586	$3,165	$3,453	$3,831	$4,911	$ 0	$ 0
2015	Current Retirees	11	11	6	13	12	6	0	0
2016	Average Benefit	$ 182	$ 602	$ 976	$2,004	$2,560	$4,693	$ 0	$ 0
2016	Average FAP	$2,457	$2,541	$2,989	$3,532	$3,820	$5,718	$ 0	$ 0
2016	Current Retirees	6	8	5	8	15	1	0	0
2017	Average Benefit	$ 326	$ 685	$1,292	$1,481	$2,645	$3,311	$3,303	$ 0
2017	Average FAP	$2,614	$2,712	$3,460	$3,301	$4,270	$4,425	$3,919	$ 0
2017	Current Retirees	7	5	7	13	18	5	1	0
2018	Average Benefit	$ 190	$ 702	$1,111	$1,886	$2,678	$2,649	$5,740	$ 0
2018	Average FAP	$1,955	$3,030	$3,452	$4,002	$3,996	$3,379	$7,510	$ 0
2018	Current Retirees	3	6	6	7	11	4	1	0
2019	Average Benefit	$ 445	$ 771	$ 882	$1,594	$2,342	$2,991	$ 0	$ 0
2019	Average FAP	$3,035	$3,094	$3,111	$3,228	$3,507	$3,912	$ 0	$ 0
2019	Current Retirees	4	6	6	6	6	5	0	0
2020	Average Benefit	$ 354	$ 512	$1,083	$1,758	$2,600	$2,427	$ 0	$3,965
2020	Average FAP	$2,804	$2,638	$3,176	$3,711	$4,141	$3,125	$ 0	$4,079
2020	Current Retirees	5	4	7	9	15	2	0	1
2021	Average Benefit	$ 238	$ 570	$ 998	$1,772	$3,098	$2,567	$ 0	$ 0
2021	Average FAP	$2,326	$2,991	$3,626	$3,575	$4,754	$3,188	$ 0	$ 0
2021	Current Retirees	9	10	10	11	9	1	0	0
2022	Average Benefit	$ 356	$ 562	$ 922	$1,673	$2,821	$3,754	$2,553	$ 0
2022	Average FAP	$2,980	$2,742	$3,131	$3,573	$4,430	$5,575	$3,411	$ 0
2022	Current Retirees	11	11	10	18	15	6	2	0

FAP = Final Average Pay

MPERS

By Years of Service

Retired In Fiscal Year		0 – 10	11 – 15	16 – 20	21 – 25	26 – 30	31 – 35	36 – 40	41+
2013	Average Benefit	$ 0	$ 0	$ 0	$ 0	$ 0	$ 7,222	$ 0	$ 0
2013	Average FAP	$ 0	$ 0	$ 0	$ 0	$ 0	$11,108	$ 0	$ 0
2013	Current Retirees	0	0	0	0	0	1	0	$ 0
2015	Average Benefit	$ 0	$ 0	$ 0	$ 0	$ 0	$ 3,207	$ 0	$ 0
2015	Average FAP	$ 0	$ 0	$ 0	$ 0	$ 0	$ 4,764	$ 0	$ 0
2015	Current Retirees	0	0	0	0	0	1	0	0
2016	Average Benefit	$ 0	$ 0	$ 0	$3,984	$ 0	$ 0	$ 0	$ 0
2016	Average FAP	$ 0	$ 0	$ 0	$9,414	$ 0	$ 0	$ 0	$ 0
2016	Current Retirees	0	0	0	1	0	0	0	0
2020	Average Benefit	$ 0	$ 0	$ 0	$ 0	$ 0	$ 9,929	$ 0	$ 0
2020	Average FAP	$ 0	$ 0	$ 0	$ 0	$ 0	$12,079	$ 0	$ 0
2020	Current Retirees	0	0	0	0	0	1	0	0

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

FAP = Final Average Pay

Schedule of Participating Employers

	MoDOT		Patrol		MPERS		Total	
	Employees	%	Employees	%	Employees	%	Employees	%
2013	4,985	67.95	2,336	31.84	15	0.21	7,336	100.00
2014	5,041	67.98	2,357	31.79	17	0.23	7,415	100.00
2015	4,993	67.72	2,364	32.06	16	0.22	7,373	100.00
2016	5,059	67.70	2,398	32.09	16	0.21	7,473	100.00
2017	5,056	67.86	2,379	31.93	16	0.21	7,451	100.00
2018	5,065	68.31	2,334	31.48	16	0.21	7,415	100.00
2019	5,081	68.51	2,318	31.26	17	0.23	7,416	100.00
2020	5,031	68.59	2,287	31.18	17	0.23	7,335	100.00
2021	4,913	68.29	2,263	31.46	18	0.25	7,194	100.00
2022	4,629	67.52	2,209	32.22	18	0.26	6,856	100.00

Data for this chart is as of June 30, 2022.

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	0	0	0	0	0
41 – 45	136	101	14	20	1
46 – 50	456	259	48	148	1
51 – 55	545	329	54	159	3
56 – 60	261	188	44	29	0
61 – 65	92	79	13	0	0
66+	17	13	4	0	0
Total	**1,507**	**969**	**177**	**356**	**5**
Average Age		**52**	**53**	**50**	**50**

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	0	0	0	0	0
31 – 35	106	51	14	41	0
36 – 40	385	219	55	109	2
41 – 45	487	286	79	120	2
46 – 50	349	238	48	61	2
51 – 55	302	227	57	17	1
56 – 60	240	192	42	5	1
61 – 65	119	102	17	0	0
66+	23	18	5	0	0
Total	**2,011**	**1,333**	**317**	**353**	**8**
Average Age		**48**	**47**	**41**	**46**

Year 2000 Plan – 2011 Tier

Age	Total	MoDOT	Civilian Patrol	Uniformed Patrol	MPERS
<21	42	38	4	0	0
21 – 25	374	234	49	91	0
26 – 30	722	443	111	167	1
31 – 35	624	384	93	146	1
36 – 40	405	307	58	40	0
41 – 45	310	245	49	15	1
46 – 50	272	221	48	2	1
51 – 55	249	193	53	3	0
56 – 60	214	168	46	0	0
61 – 65	106	79	26	0	1
66+	20	15	5	0	0
Total	**3,338**	**2,327**	**542**	**464**	**5**
Average Age		**38**	**39**	**30**	**44**

By Years of Service

Closed Plan

Years of Service	Total	MoDOT	Civilian Patrol	Uniformed Patrol	MPERS
<01	1	0	1	0	0
01 – 05	4	2	1	1	0
06 – 10	7	5	2	0	0
11 – 15	16	9	6	1	0
16 – 20	19	12	5	2	0
21 – 25	636	433	75	126	2
26 – 30	622	367	61	192	2
31 – 35	160	107	18	34	1
36 – 40	33	27	6	0	0
41 – 45	7	6	1	0	0
46+	2	1	1	0	0
Total	**1,507**	**969**	**177**	**356**	**5**
Average Service		**26**	**26**	**26**	**28**

Year 2000 Plan

Years of Service	Total	MoDOT	Civilian Patrol	Uniformed Patrol	MPERS
<01	26	22	3	1	0
01 – 05	33	28	5	0	0
06 – 10	77	57	17	3	0
11 – 15	731	453	126	147	5
16 – 20	893	595	131	165	2
21 – 25	249	178	35	35	1
26 – 30	1	0	0	1	0
31 – 35	1	0	0	1	0
36 – 40	0	0	0	0	0
41 – 45	0	0	0	0	0
46+	0	0	0	0	0
Total	**2,011**	**1,333**	**317**	**353**	**8**
Average Service		**16**	**15**	**16**	**16**

Year 2000 Plan – 2011 Tier

Years of Service	Total	MoDOT	Civilian Patrol	Uniformed Patrol	MPERS
<01	604	444	106	54	0
01 – 05	1,672	1,217	232	222	1
06 – 10	998	654	186	154	4
11 – 15	63	11	18	34	0
16 – 20	1	1	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
Total	**3,338**	**2,327**	**542**	**464**	**5**
Average Service		**4**	**4**	**5**	**7**

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	3	3	0	0	0
41 – 45	75	59	11	4	1
46 – 50	224	175	21	28	0
51 – 55	338	253	32	53	0
56 – 60	237	210	27	0	0
61 – 65	51	49	2	0	0
66+	1	1	0	0	0
Total	**929**	**750**	**93**	**85**	**1**
Average Age		**53**	**52**	**51**	**45**

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	1	1	0	0	0
31 – 35	53	34	9	10	0
36 – 40	237	177	40	20	0
41 – 45	273	214	39	20	0
46 – 50	219	188	18	13	0
51 – 55	137	116	18	3	0
56 – 60	81	70	11	0	0
61 – 65	24	21	3	0	0
66+	0	0	0	0	0
Total	**1,025**	**821**	**138**	**66**	**0**
Average Age		**45**	**44**	**41**	**0**

Year 2000 Plan – 2011 Tier

Age	Total	MoDOT	Civilian Patrol	Uniformed Patrol	MPERS
<21	0	0	0	0	0
21 – 25	3	3	0	0	0
26 – 30	60	47	7	6	0
31 – 35	85	53	15	16	1
36 – 40	48	37	7	4	0
41 – 45	31	25	2	4	0
46 – 50	29	22	4	3	0
51 – 55	20	15	5	0	0
56 – 60	18	15	3	0	0
61 – 65	8	6	2	0	0
66+	0	0	0	0	0
Total	**302**	**223**	**45**	**33**	**1**
Average Age		**38**	**39**	**35**	**33**

By Years of Service

Closed Plan

Years of Service	Total	MoDOT	Civilian Patrol	Uniformed Patrol	MPERS
<01	0	0	0	0	0
01 – 05	113	83	16	14	0
06 – 10	376	293	35	47	1
11 – 15	245	205	26	14	0
16 – 20	141	125	11	5	0
21 – 25	46	36	5	5	0
26 – 30	8	8	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
Total	**929**	**750**	**93**	**85**	**1**
Average Service		**11**	**11**	**10**	**8**

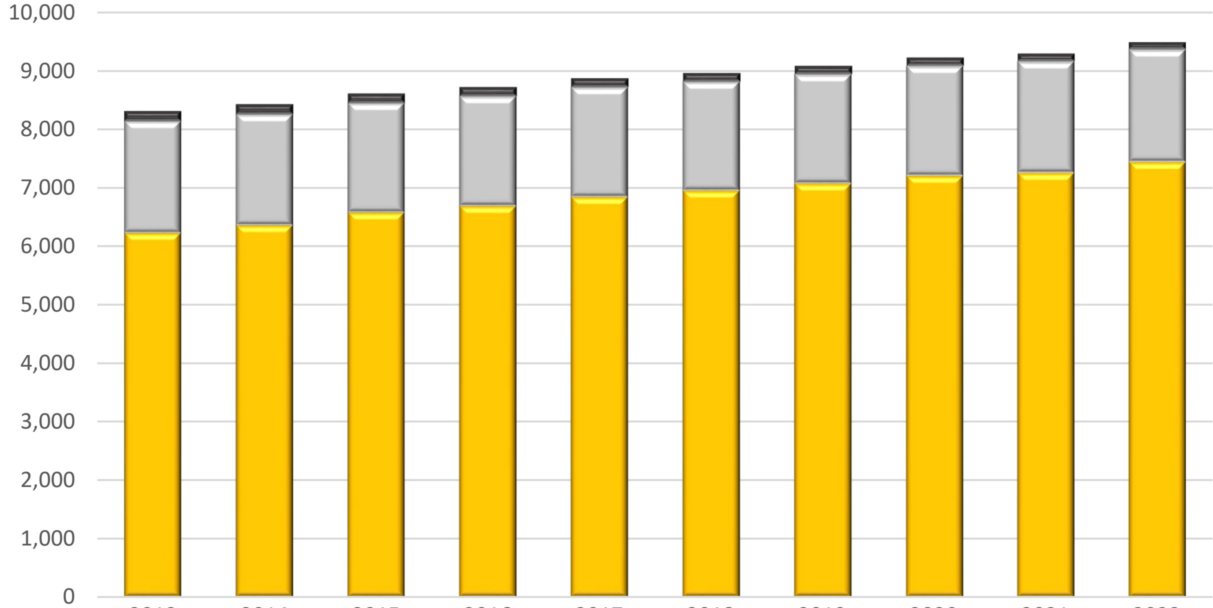
Year 2000 Plan

Years of Service	Total	MoDOT	Civilian Patrol	Uniformed Patrol	MPERS
<01	0	0	0	0	0
01 – 05	112	92	17	3	0
06 – 10	558	449	71	38	0
11 – 15	277	218	42	17	0
16 – 20	73	58	7	8	0
21 – 25	5	4	1	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
Total	**1,025**	**821**	**138**	**66**	**0**
Average Service		**10**	**10**	**10**	**0**

Year 2000 Plan – 2011 Tier

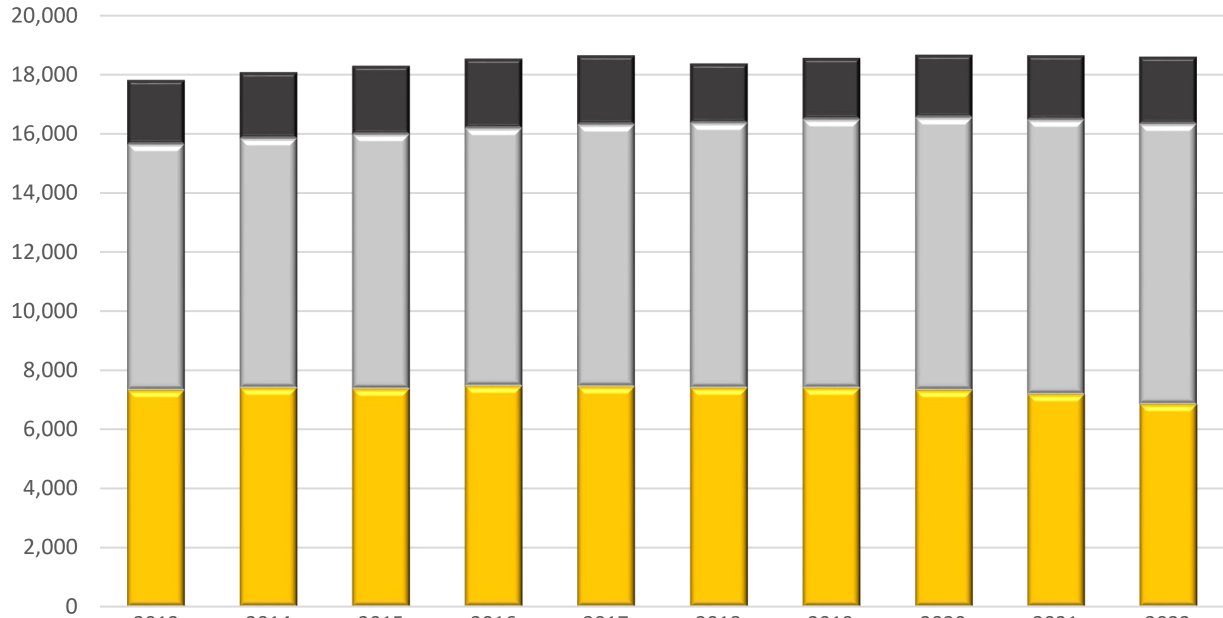
Years of Service	Total	MoDOT	Civilian Patrol	Uniformed Patrol	MPERS
<01	0	0	0	0	0
01 – 05	134	104	17	13	0
06 – 10	167	119	27	20	1
11 – 15	1	0	1	0	0
16 – 20	0	0	0	0	0
21 – 25	0	0	0	0	0
26 – 30	0	0	0	0	0
31 – 35	0	0	0	0	0
36 – 40	0	0	0	0	0
41 – 45	0	0	0	0	0
46+	0	0	0	0	0
Total	**302**	**223**	**45**	**33**	**1**
Average Service		**6**	**6**	**6**	**7**

Benefit Recipients



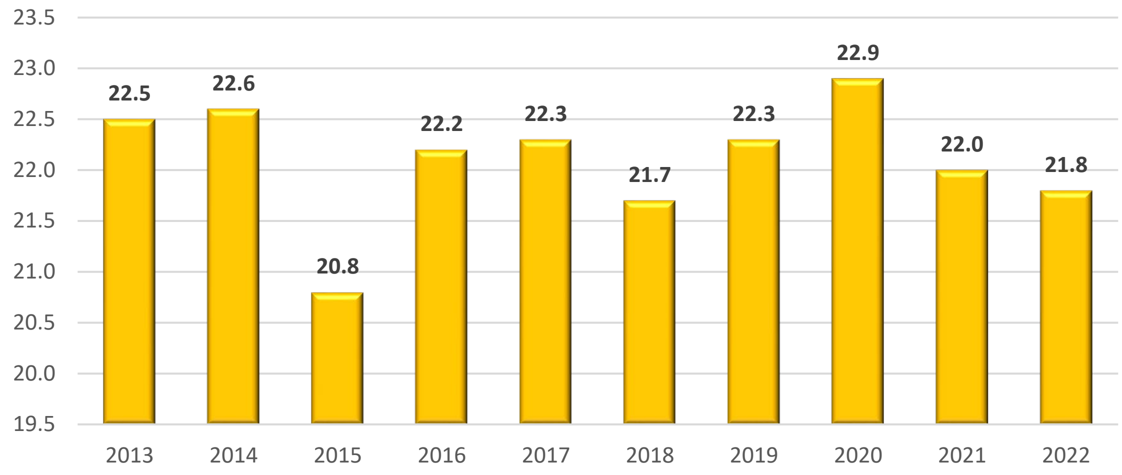
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Disabilities	178	173	164	155	155	148	143	139	128	124
Survivors	1,914	1,900	1,874	1,882	1,875	1,863	1,866	1,879	1,909	1,918
Retirees	6,234	6,365	6,583	6,690	6,846	6,956	7,077	7,208	7,254	7,444

Membership Distribution

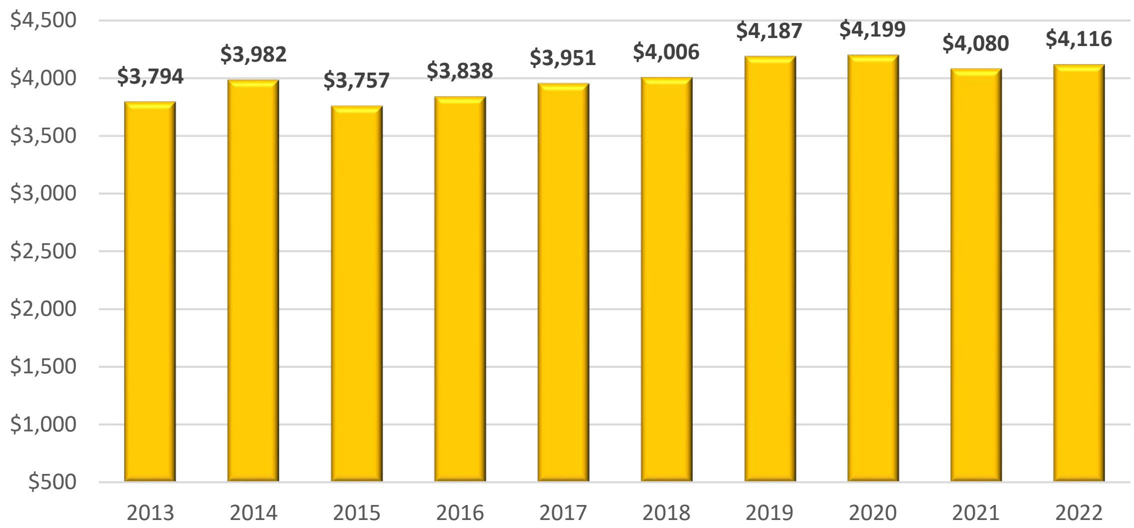


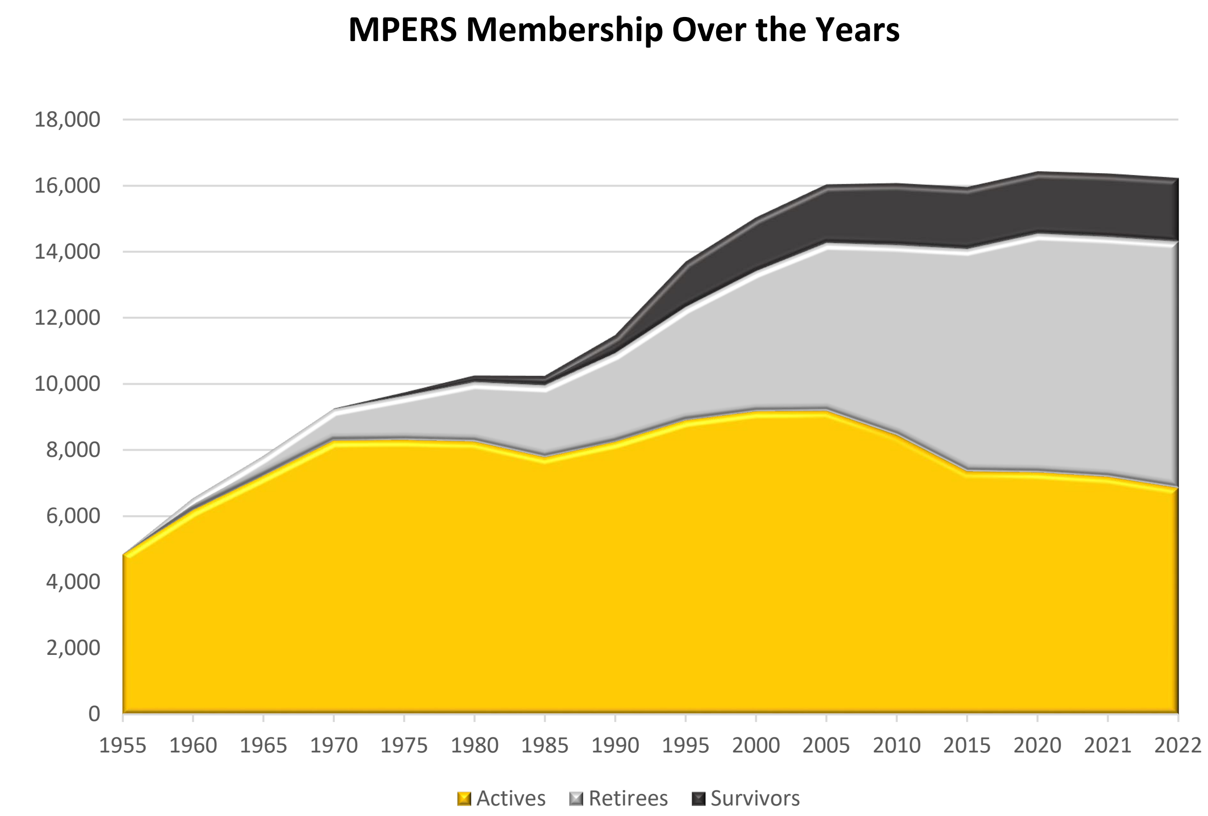
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Term Vested Members	2,153	2,222	2,300	2,329	2,319	1,985	2,051	2,099	2,153	2,256
Benefit Recipients	8,326	8,438	8,621	8,727	8,876	8,967	9,086	9,226	9,291	9,486
Active Members	7,336	7,415	7,373	7,473	7,451	7,415	7,416	7,335	7,194	6,856

Average Years of Service for New Retirees



Final Average Pay for New Retirees





MPERS Membership Over the Years
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
2021
2022
Actives
Retirees
Survivors

This map represents the demographic distribution of reitrees by state and country as of June 30, 2022.