FINANCIAL SECTION

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CPAs & BUSINESS ADVISORS

Independent Auditor's Report

To the Board of Trustees
Missouri State Employees' Retirement System
Jefferson City, Missouri

Report on the Audit of the Financial Statements

Opinions

We have audited the financial statements of pension funds and custodial fund, collectively the aggregate fiduciary funds of the Missouri State Employees' Retirement System (MOSERS), a pension (and other employee benefit) trust fund of the State of Missouri, as of and for the year ended June 30, 2023, and the related notes to the financial statements, which collectively comprise MOSERS's basic financial statements as listed in the table of contents.

In our opinion, the accompanying financial statements referred to above present fairly, in all material respects, the respective fiduciary net position of the pension funds and custodial fund, collectively the aggregate fiduciary funds of MOSERS, as of June 30, 2023, and the respective changes in fiduciary net position for the year then ended in accordance with accounting principles generally accepted in the United States of America.

Basis for Opinion

We conducted our audit in accordance with auditing standards generally accepted in the United States of America (GAAS) and the standards applicable to financial audits contained in *Government Auditing Standards* (*Government Auditing Standards*), issued by the Comptroller General of the United States. Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the Financial Statements section of our report. We are required to be independent of MOSERS and to meet our other 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 basis for our audit opinion.

Responsibilities of Management for the Financial Statements

Management is responsible for the preparation and fair presentation of the financial statements in accordance with accounting principles generally accepted in the United States of America; and for 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.

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Auditor's 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 auditor's report that includes our opinions. 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 GAAS and *Government 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 GAAS and *Government 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 MOSERS' 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.

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

Accounting principles generally accepted in the United States of America require that the management's discussion and analysis and required supplementary information on pages 20-23 and 52-59 be presented to supplement the basic financial statements. Such information is the responsibility of management and, 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 GAAS, 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.

Supplementary Information

Our audit was conducted for the purpose of forming an opinion on the financial statements that collectively comprise the MOSERS' basic financial statements. The additional supplementary information accompanying financial information listed as additional supplemental schedules in the table of contents are presented for purposes of additional analysis and are not a required part of the basic financial statements. Such information is the responsibility of management and was derived from and relates directly to the underlying accounting and other records used to prepare the basic financial statements. The information has been subjected to the auditing procedures applied in the audit of the basic financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the basic financial statements or to the basic financial statements themselves, and other additional procedures in accordance with auditing standards generally accepted in the United States of America. In our opinion, the additional supplementary information accompanying financial information listed as additional supplemental schedules in the table of contents are fairly stated, in all material respects, in relation to the basic financial statements as a whole.

Other Information

Management is responsible for the other information included in the annual report. The other information comprises the introductory, investment, actuarial, and statistical sections but does not include the basic financial statements and our auditor's report thereon. Our opinion on the basic financial statements does not cover the other information, and we do not express an opinion or any form of assurance thereon.

In connection with our audit of the financial statements, our responsibility is to read the other information and consider whether a material inconsistency exists between the other information and the basic financial statements, or the other information otherwise appears to be materially misstated. If, based on the work performed, we conclude that an uncorrected material misstatement of the other information exists, we are required to describe it in our report.

Other Reporting Required by Government Auditing Standards

In accordance with *Government Auditing Standards*, we have also issued our report dated November 13, 2023, on our consideration of the MOSERS' internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements and other matters. The purpose of that report is solely to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on the effectiveness of MOSERS' internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering MOSERS' internal control over financial reporting and compliance.

Eide Bailly LLP

Boise, Idaho

November 13, 2023

Management's Discussion and Analysis

This discussion and analysis of the Missouri State Employees' Retirement System (MOSERS) provides an overview of the retirement system's financial activities for the fiscal year ended June 30, 2023. It is intended to be used in conjunction with the *Transmittal Letter* beginning on page 6 and *Basic Financial Statements* and *Notes to the Basic Financial Statements*, beginning on page 24 of this report.

Using This Financial Report

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

See the *Actuarial Section* of this report for a detailed discussion of the actuarial value of assets and liabilities and the funded status of the plans.

The *Basic Financial Statements* contained in this section of the ACFR consist of:

- The *Statements of Fiduciary Net Position* report the fiduciary funds' assets, deferred outflows, liabilities, deferred inflows, and resulting net position, where total assets plus deferred outflows less current liabilities and deferred inflows equal net position held in trust for future pension benefits available at the end of the fiscal year. It is a snapshot of the financial position of the fiduciary funds at that specific point in time.
- The *Statements of Changes in Fiduciary Net Position* summarize the fiduciary funds' financial transactions that have occurred during the fiscal year where additions less deductions equal the change in net position. It supports the change that has occurred to the prior year's net position on the *Statements of Fiduciary Net Position.*
- The *Notes to the Basic Financial Statements* are an integral part of the above financial statements and include additional information not readily evident in the statements themselves.

Funding Analysis

Funded status is presented using two different valuation methods within this document for two different purposes. One valuation method is for the purpose of determining contribution rates, and the other method is required by Governmental Accounting Standards Board (GASB) Statement 67 to provide information about the net pension liability as of a specific point in time using the market value of investment assets. The valuation method used for determining contribution rates smooths investment activity over a period of five years to minimize the impact investment market volatility can have on contribution rates.

Funding Methodology for Determining Contribution Rates

The unfunded actuarial accrued liability (UAAL) for the Missouri State Employees' Plan (MSEP) increased by $0.345 billion from $6.515 billion at June 30, 2022, to $6.860 billion at June 30, 2023, with a corresponding decrease in funded percentage from 57.7% to 57.6%. The primary driver for the increase in the UAAL was an actuarial loss on liability experience due to inflationary increases in covered payroll causing the projection of future benefit payments to increase. Although increases in covered payroll increase the UAAL, it has a less significant effect on the contribution rate because the larger covered payroll base naturally results in more retirement contributions flowing into the system.

The UAAL for the Judicial Plan increased by $21 million from $426 million at June 30, 2022, to $447 million at June 30, 2023, with a decrease in funded percentage from 32.4% to 31.7%.

The assumed rate of investment return was 6.95% for both the MSEP and the Judicial Plan.

Financial Reporting Methodology required by GASB Statement 67

The fund net position as a percentage of total pension liability decreased from 53.5% at June 30, 2022, to 52.9% at June 30, 2023, for the MSEP Fund, and decreased from 30.2% to 29.1% for the Judicial Plan Fund. See the *Required Supplementary Information* section of this report for more information about net pension liability and related information.

Financial Reporting Highlights

The *Summary Comparative Statements of Fiduciary Net Position*, and the *Summary Comparative Statements of Changes in Fiduciary Net Position* presented below are designed to provide the reader of this report with a high level overview of MOSERS' financial activity and net position.

Summary Comparative Statements of Fiduciary Net Position

	As of June 30, 2023	As of June 30, 2022	Amount of Change	Percentage Change
Assets				
Administrative operating cash and equivalents	$ 14,176,248	$ 14,957,215	$ (780,967)	(5.22%)
Receivables	801,745,263	977,028,152	(175,282,889)	(17.94)
Investments	12,207,445,578	12,239,716,310	(32,270,732)	(0.26)
Capital assets, net of accumulated depreciation	15,148,833	14,237,807	911,026	6.40
Total assets	13,038,515,922	13,245,939,484	(207,423,562)	(1.57)
Deferred outflow of resources	1,078,184	770,232	307,952	39.98
Liabilities				
Administrative and other payables	16,049,335	15,864,368	184,967	1.17
Investment related payables and obligations	4,263,787,195	4,780,687,176	(516,899,981)	(10.81)
MOSERS investment portfolio liability (MIP)	3,632,433	3,539,587	92,846	2.62
Net OPEB liability	5,635,287	6,413,236	(777,949)	(12.13)
Total liabilities	4,289,104,250	4,806,504,367	(517,400,117)	(10.76)
Deferred inflow of resources	2,256,993	1,216,203	1,040,790	85.58
Net position restricted for fiduciary activities	$ 8,748,232,863	$ 8,438,989,146	$ 309,243,717	3.66

The largest components of the net position of the pension trust funds are investments, and investment related receivables and liabilities. The majority of MOSERS' receivable balances are comprised of investment related transactions, such as pending trade settlements, and interest and dividends receivable. Investment related liabilities include payables for investments purchased, manager fees payable, and obligations under repurchase agreements. MOSERS investment portfolio liability (MIP) represents the amount Missouri Deferred Compensation Plan participants have invested in MOSERS' portfolio.

The value of the investment portfolio, which includes investments, and investment related receivable and liability balances, did not change significantly this year. The markets were volatile during the fiscal year due to uncertainty about the future of interest rates, inflation and economic growth. MOSERS experienced a 2.53% time-weighted return on plan assets. In addition, the state of Missouri made an additional contribution of $500 million to the MSEP during the beginning of the fiscal year which allowed for positive net position growth for the MSEP fund. MOSERS, like other mature pension plans, relies in part on cash flow generated from investments, to fund benefit payments.

Another noteworthy change in MOSERS' *Statement of Fiduciary Net Position* is the increase in capital assets related to the continued development of our new pension administration system. MOSERS capitalized approximately $1.0 million in project costs incurred during the year. When the new pension administration system is implemented, these capitalized software development project costs will be amortized over the estimated useful life of the system. The project timeline has been extended to allow more time to test the system prior to deployment, and the project is now expected to be completed in 2024.

Summary Comparative Statements of Changes in Fiduciary Net Position

	Year Ended June 30, 2023	Year Ended June 30, 2022	Amount of Change	Percentage Change
Additions				
Contributions	$ 1,206,881,008	$ 587,430,121	$ 619,450,887	105.45%
Net investment income (loss)	181,851,788	(835,205,231)	1,017,057,019	(121.77)
Miscellaneous income	480,766	485,972	(5,206)	(1.07)
Total additions	1,389,213,562	(247,289,138)	1,636,502,700	(661.78)
Deductions				
Benefit payments	1,024,251,130	992,014,868	32,236,262	3.25
Premium disbursements	31,737,102	29,896,004	1,841,098	6.16
Service transfers and refunds	12,425,868	13,134,944	(709,076)	(5.40)
Administrative expenses	11,555,745	9,808,530	1,747,215	17.81
Total deductions	1,079,969,845	1,044,854,346	35,115,499	3.36
Net increase (decrease)	309,243,717	(1,292,143,484)	1,601,387,201	(123.93)
Net position beginning of year	8,438,989,146	9,731,132,630	(1,292,143,484)	(13.28)
Net positions restricted for fiduciary activities	$ 8,748,232,863	$ 8,438,989,146	$ 309,243,717	3.66

Investment Results

MOSERS' total fund net position increased by $0.3 billion, to end at $8.7 billion in fiscal year 2023. Net position increased slightly from last year, driven primarily by a $500 million ad hoc contribution from the state of Missouri. The fund returned a time-weighted return of 2.53% in fiscal year 2023 compared to (9.02)% in fiscal year 2022.

In an effort to bring inflation under control, the Federal Reserve has continued to steadily increase interest rates. There have been mixed economic signals in the market place during the year creating uncertainty about the near-term future of the economy. This uncertainty in the investment environment and shift to higher interest rates has generally resulted in mixed results in many asset classes this year. Growth assets experienced positive returns but fixed income assets produced negative returns. As further discussed in the *Investment Section* of this report, we continue to recognize the importance of diversifying our investment assets to contribute to our long-term success.

It is also important to note that investment gains and losses are actuarially smoothed over a 5-year period to prevent market volatility from causing significant year-to-year changes in the contribution rate.

The *Investment Section* of this report contains additional information regarding investments activity.

Contribution Revenue

MOSERS received a $500 million one-time additional contribution from the state of Missouri during fiscal year 2023. This one-time contribution accounts for most of the year-over-year percent increase in contributions revenue.

Excluding the $500 million additional contribution by the state of Missouri, contribution revenue increased by 20.3% from the prior year. This increase in contribution revenue is primarily due to two factors: the contribution rate increased, and the covered payroll of active benefit-eligible employees increased. The contribution rate is set in advance; however, unexpected changes in covered payroll can cause contribution revenue to come in above or below expectation.

The employer retirement contribution rates for the MSEP members is the primary driver for total fund contributions revenue. This rate increased from 23.51% in fiscal year 2022 to 26.33% in fiscal year 2023. The employee contribution rates for 2011 tier members is set by statute at 4% of gross pay. The percent of MSEP 2011 tier members who contribute 4% continues to grow every year to make up a larger percentage of our overall membership base. As of June 30, 2023, 62% of the active membership population were MSEP 2011 members.

Covered payroll is the other primary factor that ultimately determines our contribution revenue. There was a significant increase in covered payroll during the fiscal year. The active MSEP membership base increased this year by 3.6%, reversing a multi-year trend of decreases. Active MSEP member covered payroll increased this year by almost 13%. These increases were greater than our actuarial assumptions.

Judicial Plan contributions and Insurance fund premium contributions each account for less than 10% of total fund contributions revenues. Covered payroll for judges increased 2.1% over last year based on the actuarial valuation report. Contributions were slightly higher than last year because, although the fiscal year 2023 contribution rate was lower than the fiscal year 2022 rate, covered payroll increased. In addition, the active membership population was comprised of 73% of Judicial Plan 2011 tier members, compared to 63% last year. Insurance fund premium contributions were also higher than the prior year.

The *Actuarial Section* of this report contains more information about our actuarial assumptions and experience.

Benefits Expenses

Benefit payment expenses were 3.25% greater than the prior year due to a growing retiree population and cost-of-living adjustments (COLAs).

The population of retirees receiving benefits continued to grow during the fiscal year. A growing retiree population puts upward pressure on the contribution rate. Schedules of retirees added and removed from the benefit rolls can be viewed on pages 103-104 of the *Actuarial Section* of this report.

COLAs provided to existing benefit recipients also cause benefit expenses to increase each year. Members employed before August 28, 1997, who retired under the MSEP, receive a COLA of at least 4% each year (maximum 5%) until they reach their COLA cap. For general state employees, COLAs are based on 80% of the percentage increase in the average Consumer Price Index (CPI) from one year to the next. The maximum increase is 5% (minimum 0%). The cost-of-living adjustment for fiscal year 2023 was 5%.

Administrative Expenses

Administrative expenses totaled $11.6 million in fiscal year 2023, compared to $9.8 million in fiscal year 2022. MOSERS experienced an increase in administrative expense due mainly to increases in personal services and fringe benefits.

Requests for Information

This financial report is designed to provide a general overview of the System's finances for all those who are interested. Questions concerning any of the information provided in this report or requests for additional information should be addressed to MOSERS at P.O. Box 209, Jefferson City, MO 65102 or by email at *FOLArequest@mosers.org*.

Statements of Fiduciary Net Position

As of June 30, 2023

	MSEP Pension Fund	Judicial Pension Fund	Insurance Custodial Fund	Total
Assets				
Administrative operating cash and cash equivalents	$ 10,855,339	$ 28	$ 3,320,881	$ 14,176,248
Receivables				
Contributions and premiums	24,945,897	3,417,363	968,849	29,332,109
Investment income	568,066,057	12,513,180	0	580,579,237
Investment sales	187,635,066	4,128,682	0	191,763,748
Other receivables	70,169	0	0	70,169
Total receivables	780,717,189	20,059,225	968,849	801,745,263
Investments and derivatives				
Investments - cash and cash equivalents	1,731,235,920	38,112,082	0	1,769,348,002
Investments - treasuries	4,217,530,799	92,836,642	0	4,310,367,441
Investments - fixed income	214,747,999	4,722,641	0	219,470,640
Investments - equities	331,462,851	7,302,456	0	338,765,307
Investments - real estate investment trusts	431,782,070	9,502,191	0	441,284,261
Investments - equity and fixed income commingled funds	1,057,900,792	23,290,053	0	1,081,190,845
Investments - alternatives and limited partnerships	3,953,669,099	87,041,395	0	4,040,710,494
Investments - derivative instruments	6,172,813	135,775	0	6,308,588
Total investments and derivatives	11,944,502,343	262,943,235	0	12,207,445,578
Capital assets, net of accumulated depreciation	15,148,833	0	0	15,148,833
Total assets	12,751,223,704	283,002,488	4,289,730	13,038,515,922
Deferred outflow of resources	1,054,867	23,317	0	1,078,184
Liabilities				
Administrative and benefit expense payables	10,574,603	682,939	4,076,870	15,334,412
Employee vacation and overtime liability	699,462	15,461	0	714,923
Payable for investments purchased	75,514,534	1,661,800	0	77,176,334
Management fees payable	1,142,335	24,824	0	1,167,159
Investment activities payable	568,988,340	12,535,324	0	581,523,664
Obligations under repurchase agreements	3,526,290,255	77,629,783	0	3,603,920,038
MOSERS investment portfolio liability (MIP)	3,554,193	78,240	0	3,632,433
Net OPEB liability	5,513,418	121,869	0	5,635,287
Total liabilities	4,192,277,140	92,750,240	4,076,870	4,289,104,250
Deferred inflow of resources	2,208,183	48,810	0	2,256,993
Net position restricted for pension activities	8,557,793,248	190,226,755	0	8,748,020,003
Net position restricted for custodial activities	0	0	212,860	212,860
Net position restricted for fiduciary activities	$ 8,557,793,248	$ 190,226,755	$ 212,860	$ 8,748,232,863

See accompanying *Notes to the Basic Financial Statements.*

Statements of Changes in Fiduciary Net Position

For the Year Ended June 30, 2023

	MSEP Pension Fund	Judicial Pension Fund	Insurance Custodial Fund	Total
Additions				
Contributions and premiums				
Employer contributions and premiums	$ 582,381,146	$ 39,064,758	$ 14,443,413	$ 635,889,317
Additional state contribution	500,000,000	0	0	500,000,000
Employee contributions and premiums	48,487,731	1,746,913	17,312,120	67,546,764
Member purchases of service credit	1,591,102	0	0	1,591,102
Service transfer contributions	3,573,592	0	0	3,573,592
Prepaid employer contributions discount	(1,719,767)	0	0	(1,719,767)
Total contributions and premiums	1,134,313,804	40,811,671	31,755,533	1,206,881,008
Investment activity				
Investing activity income:				
Net appreciation in fair value of investments	479,770,983	10,734,914	0	490,505,897
Interest	86,907,078	1,910,074	87,335	88,904,487
Dividends	21,930,229	483,874	0	22,414,103
Other	320,748	7,141	0	327,889
Total investing activity income	588,929,038	13,136,003	87,335	602,152,376
Investing activity expenses:				
Management and incentives fees	129,285,045	2,855,114	0	132,140,159
Custody and other fees	608,585	13,460	0	622,045
Consultant fees	858,652	18,881	0	877,533
Internal investment activity expenses	6,339,930	57,485	0	6,397,415
Total investing activity expenses	137,092,212	2,944,940	0	140,037,152
Reverse repurchase agreement activity:				
Loss on assets in reverse repurchase agreements	(144,334,848)	(3,156,494)	0	(147,491,342)
Interest expense from reverse repurchase agreements	(129,903,188)	(2,868,906)	0	(132,772,094)
Total net loss from reverse repurchase agreement activity	(274,238,036)	(6,025,400)	0	(280,263,436)
Total net investment income	177,598,790	4,165,663	87,335	181,851,788
Miscellaneous income	646	0	480,120	480,766
Total additions	1,311,913,240	44,977,334	32,322,988	1,389,213,562
Deductions				
Benefit payments	917,235,787	45,108,589	0	962,344,376
Premium disbursements	0	0	31,737,102	31,737,102
BackDROP payments	61,834,625	0	0	61,834,625
Buyout and lump-sum payments	72,129	0	0	72,129
Service transfer payments	4,426,152	0	0	4,426,152
Contribution and premium refunds	7,981,346	0	18,370	7,999,716
Administrative expenses	10,984,550	91,076	480,119	11,555,745
Total deductions	1,002,534,589	45,199,665	32,235,591	1,079,969,845
Net increase (decrease) in net position	309,378,651	(222,331)	87,397	309,243,717
Net position restricted for fiduciary activities:				
Beginning of year	8,248,414,597	190,449,086	125,463	8,438,989,146
End of year	$ 8,557,793,248	$ 190,226,755	$ 212,860	$ 8,748,232,863

See accompanying *Notes to the Basic Financial Statements*.

Notes to the Basic Financial Statements

Note 1 – Plan Descriptions and Contribution Information

The MSEP and the Judicial Plan are pension plans covering substantially all state of Missouri employees and judges.

Missouri State Employees' Plan (MSEP)

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

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

The Board intends to follow a financing pattern that computes and requires contribution amounts which, expressed as a percent of active member payroll, will remain approximately level from year to year and from one generation of citizens to the next. For the year ended June 30, 2023, the employer contribution rate was 26.33% of covered payroll.

Complete recognition of the year-to-year swings in the fair value of System assets would produce contribution rate changes that would run counter to the "approximately level" goal. A common actuarial practice, referred to as asset smoothing, is used to address that issue. Recognizing the difference between the actual and assumed investment returns over a closed, five-year period helps ensure a more stable contribution rate.

At any point in time, the actuarial value of assets will be more or less than the fair value but, if the smoothing method is prudent and properly constructed, those values will converge over time. As of June 30, 2023, the ratio of actuarial value of assets to fair value of assets was 109.04%, for the MSEP.

Per the June 30, 2023, actuarial valuation, membership in the MSEP consisted of the following:

Retirees and beneficiaries currently receiving benefits		54,709
Active		
Vested	25,223	
Nonvested	17,865	43,088
Inactive		
Vested (not yet receiving benefits)*	18,305	
Nonvested (with contribution balances)	31,575	49,880
Total membership		147,677

** Includes 106 members on leave of absence and 548 members on long-term disability*

Generally, all full-time state employees, employed before July 2000, who became vested and were not covered under another state-sponsored retirement plan, are eligible for membership in the MSEP (closed plan). Full-time state employees who were employed after July 1, 2000, but before January 1, 2011, are members of the MSEP 2000.

Those first employed in a benefit-eligible position on or after January 1, 2011, are members of the MSEP 2011 tier of the MSEP 2000.

MOSERS participates as an employer in the MSEP and MSEP 2000, including the MSEP 2011 tier.

Unless otherwise delineated, data for the MSEP is inclusive of members in the MSEP 2000 and MSEP 2011, which all provide defined benefit pension, survivor, life insurance, and long-term disability benefits.

Employer contributions for the MSEP are determined through annual actuarial valuations. The required contributions are expressed as a percentage of covered payroll. The state of Missouri and its component employers make required contributions to the plans. Employer contributions for the fiscal year ended June 30, 2023, were 26.33% of covered payroll. Members of MSEP and MSEP 2000 do not make employee contributions. Members of MSEP 2011 tier are required to contribute 4% of covered payroll.

Final average pay (FAP), is the average pay of a member for the 36 full, consecutive months of service before termination of employment when the member's pay was greatest. If the member was on workers compensation leave of absence or medical leave of absence due to an employee illness, or on long-term disability, FAP is the amount of pay the member would have received, but for such leave of absence as reported and verified by the employing department. If the member was employed for less than 36 months, FAP is the average monthly pay of a member during the period for which the member was employed.

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

MSEP (closed plan)

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

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

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

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

Qualified, inactive-vested members may make a one-time election to receive the present value of their future benefit in a lump-sum payment rather than a monthly benefit at retirement age. To qualify, members must have left state employment on or after October 1, 1984, and prior to September 1, 2002, have less than 10 years of service, not be within five years of retirement eligibility, and meet age requirements. In addition, if members left state employment on or after August 28, 1997, and prior to September 1, 2002, the present value of their benefit must be less than $10,000.

MSEP 2000

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

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

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

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

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

MSEP 2011 Tier

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

Legislation signed into law on July 14, 2017, changed the original vesting requirement of 10 years to five years for actively employed members of the MSEP 2011, effective January 1, 2018.

Under the MSEP 2011, general employees may retire with full benefits upon the earliest of attaining:

- Age 67 with 5 years of service; or
- Age 55 with age and service equaling 90 or more – "Rule of 90."

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

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

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

Judicial Plan

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

Judges and commissioners of the supreme court or the court of appeals, judges of any circuit court, probate court, magistrate court, court of common pleas, court of criminal corrections, justices of the peace, commissioners or deputy commissioners of the probate division of the circuit court appointed after February 29, 1972, in a first class county having a charter form of government in a city not within a county, commissioners of the juvenile division of the circuit court appointed pursuant to Section 211.023, RSMo, commissioners of the drug court or commissioners of any family court are eligible for membership in the Judicial Plan. The Judicial Plan provides defined benefit pension and survivor benefits. Members are immediately vested.

Per the June 30, 2023, actuarial valuation, membership in the Judicial Plan consisted of the following:

Retirees and beneficiaries currently receiving benefits		619
Active		
Vested	415	
Nonvested	0	415
Inactive		
Vested (not yet receiving benefits)		32
Total membership		1,066

Funding of the Judicial Plan on an actuarial basis began on July 1, 1998. Employer contributions are determined through annual actuarial valuations. For the year ended June 30, 2023, the employer contribution rate was 60.17% of covered payroll. The state of Missouri makes the employer contribution to the Judicial Plan. Members of the Judicial Plan (closed plan) do not make employee contributions. Members of the Judicial Plan 2011 tier are required to contribute 4% of covered payroll.

Judicial Plan (closed plan)

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

- Age 62 with 12 years of service; or
- Age 60 with 15 years of service; or
- Age 55 with 20 years of service.

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

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

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

Qualified, inactive-vested members may make a one-time election to receive the present value of their future benefit in a lump-sum payment rather than a monthly benefit at retirement age. To qualify, they must have left state employment on or after August 28, 1997, and prior to September 1, 2002, have less than 10 years of service, not be within five years of retirement eligibility, and have a benefit present value of less than $10,000.

Judicial Plan 2011 Tier

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

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

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

Judicial Plan 2011 members may retire early at age 67 with less than 12 years of service with reduced benefits, or age 62 with less than 20 years of service with a reduced benefit based on years of service.

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

Administrative Law Judges and Legal Advisors' Plan

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

Missouri State Insured Defined Benefit Insurance Plan

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

The plan also provides duty-related death benefits, optional life insurance for active employees and retirees who are eligible for basic coverage, and a long-term disability insurance plan for eligible members. For a more detailed description of insurance benefits, refer to pages 117-118 in the *Actuarial Section* of this report.

Due to the nature of MOSERS' reliance on funding from the state of Missouri and its component employers, and the overall control of the plan document by the legislative and executive branches of state government, the Missouri State Insured Defined Benefit Insurance Plan is considered a component unit of the state of Missouri financial reporting entity and is included in the state's financial reports.

State of Missouri Deferred Compensation Plan (MO Deferred Comp)

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

The MO Deferred Comp plan is comprised of a 457 deferred compensation plan for employee contributions and a related 401(a) plan for an employer incentive match contribution. MOSERS uses MissionSquare Retirement as an external provider for record keeping for the plans. These plans have separately issued financial statements. The net position of these plans was approximately $2.1 billion and $636.9 million as of June 30, 2023, for the 457 and 401(a) plans, respectively.

MOSERS unitizes investments for the purpose of allowing participants in the State of Missouri Deferred Compensation Plan the option to invest in the MOSERS investment portfolio (MIP). For financial reporting purposes, investments throughout this ACFR are reported in whole and include 0.04%, or approximately $3.6 million, of the units invested in the MIP by Deferred Compensation participants. Effective June 30, 2017, the option to invest in the MIP fund was no longer available to Plan participants. All participants invested in the MIP fund as of that date may continue to defer into it, but no rollovers or new elections are permitted.

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

Colleges & Universities Retirement Plan (CURP)

The Colleges & Universities Retirement Plan (CURP) is a defined contribution plan administered by MOSERS for education employees (as determined by the university) at nine Missouri state universities. Retirement income from the plan is dependent upon the employee's plan account balance at retirement. The employee's plan account balance is built from mandatory contributions to the plan and the investment returns generated from employee-selected investment options. To be eligible for the CURP, the employee must:

- meet the definition of "education employee" as defined by their employer, and
- be employed in this position for the first time on or after July 1, 2002, and
- not have previous employment in a position covered by another defined benefit pension plan administered by MOSERS, and
- be employed at a participating regional Missouri university.

After six years of participation in CURP, the employee may transfer to a MOSERS defined benefit pension plan and will immediately become a vested member of MSEP 2011. By transferring to MOSERS, the employee forfeits all rights to future participation in CURP (i.e., they can't go back to CURP). However, the employee will continue to own and control their CURP account. CURP activities are not included within this report.

Note 2 – Summary of Significant Accounting Policies

Basis of Accounting

The accompanying financial statements are prepared in accordance with accounting principles generally accepted in the U.S. that apply to governmental accounting on an accrual basis.

Contributions are recognized as revenues when due, pursuant to statutory requirements. Benefits, refunds, and backDROP payments are recognized when due and payable. Administrative and other expenses are recorded when the corresponding liabilities are incurred.

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 accompanying financial statements and disclosures. Actual results could differ from those estimates.

Method Used to Value Investments

Investment assets are reported at fair value, in accordance with Standards issued by the Governmental Accounting Standards Board (see Note 3 for discussion of the valuation methodology for investment assets). The *Schedule of Investments and Derivative Instruments Measured at Fair Value* in Note 3 presents the fair value information of the investments as reported on the *Statements of Fiduciary Net Position.*

MOSERS' Participation in Other Post-Employment Benefit (OPEB) Programs

Other Post-employment Benefit (OPEB) related items, including: Net OPEB liability, deferred outflows of resources, deferred inflows of resources, net OPEB expense, fiduciary net assets, additions to and deductions from fiduciary net assets have been determined on the same basis as they are reported by MCHCP. For this purpose, employer contributions are recognized as revenue when due and payable. Benefits are recognized when due and payable in accordance with the terms of the Plan (see *Note 7 – MCHCP Post-Employment Retiree Health Care OPEB Program*).

Capital & Intangible Assets

The MOSERS building and other capital assets are stated at cost less accumulated depreciation. Intangible assets include software applications and are stated at cost less accumulated amortization. Intangible assets are reported with capital assets in the *Statements of Changes in Fiduciary Net Position.* Capital and intangible assets are depreciated on a straight-line basis over their estimated useful lives. MOSERS evaluates leases and subscription-based information technology arrangements to determine if they should be capitalized as right-to-use assets. Right-to-use assets are depreciated on a straight-line basis over the non-cancellable life of the lease.

Note 3 – Cash and Investments

Cash Deposits with Financial Institutions

MOSERS requires its business bank to collateralize amounts on deposit that exceed the Federal Deposit Insurance Corporation (FDIC) insured amount. The types of collateral security shall be included on a list maintained by the State Treasurer's office in accordance with Section 30.270 RSMo. Securities pledged as collateral are held in agency by a separate bank. As of June 30, 2023, all deposit balances with MOSERS' business bank were fully collateralized.

Investment Policy

Section 104.440, RSMo allows the Board of Trustees to invest the trust fund assets in accordance with the prudent person rule. In June 2018, the Board voted to adopt a new asset allocation, which includes four broad categories: growth, income, inflation hedge, and absolute return.

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

The Board has authorized staff to create and maintain a portfolio that utilizes a modest amount of leverage in order to diversify the risk across the four asset class categories contained in the portfolio. The market exposure is limited to 1.5 times capital. The limit may also be stated as 150% of capital. The table below illustrates the fair value, market exposure, and policy exposure of the portfolio by asset class as of June 30, 2023.

Schedule of Internally Managed Leverage

	Fair Value Capital	Percent of Portfolio at Fair Value	Market Exposure	Percent of Portfolio at Market Exposure	Policy Exposure
Growth	$ 3,952,118,840	45.3%	$ 3,951,986,999	45.4%	45.0%
Income	1,538,840,923	17.7%	3,023,772,994	34.7	35.0
Inflation hedge	1,467,882,502	16.9%	3,516,474,491	40.4	40.0
Absolute return	1,750,789,042	20.1%	1,750,789,320	20.1	20.0
Total portfolio	$ 8,709,631,307	100.0%	$ 12,243,023,804	140.6%	140.0%

The long-term expected rate of return on pension plan investments was determined using a building-block method in which best-estimate rates of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class. These ranges are combined to produce the long-term expected rate of return by weighting the expected future rates of return by the target asset allocation percentage and by adjusting for expected inflation, volatility, and correlations. Best estimates of the real rates of return for each major asset class included in MOSERS' target asset allocation as of June 30, 2023, are summarized in the table below.

Target Asset Allocation

Asset Class	Policy Allocation	Long-Term Expected Nominal Return*	Long-Term Expected Real Return	Weighted Average Long-Term Expected Nominal Return
Global public equities	30.0%	7.7%	5.8%	2.3%
Global private equities	15.0	9.3	7.4	1.4
Long treasuries	25.0	3.5	1.6	0.9
Core bonds	10.0	3.1	1.2	0.3
Commodities	5.0	5.5	3.6	0.3
TIPS	25.0	2.7	0.8	0.7
Private real assets	5.0	7.1	5.2	0.3
Public real assets	5.0	7.7	5.8	0.4
Hedge funds	5.0	4.8	2.9	0.2
Alternative beta	10.0	5.3	3.4	0.5
Private credit	5.0	9.5	7.6	0.5
Cash and cash equivalents**	(40.0)	0.0	0.0	0.0
	100.0%			
			Correlation/volatility adjustment	(0.6)
			Long-term expected net nominal return	7.2
			Less: investment inflation assumption	(1.9)
			Long-term expected geometric net real return	5.3 %

* *Long-term expected arithmetic returns of the asset classes at the time of the asset allocation study for the portfolio.*

** *Cash and cash equivalents policy allocation amounts are negative due to use of leverage.*

Money-Weighted Rate of Return

The annual money-weighted rate of return on pension plan investments, net of pension plan investment expense, was 2.13% for the year ended June 30, 2023. The money-weighted rate of return expresses investment performance, net of investment expense, adjusted for changing amounts actually invested.

Fair Value Measurement

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

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

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

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

In instances where inputs used to measure fair value fall into different levels in the fair value hierarchy, fair value measurements in their entirety are categorized based on the lowest level input that is significant to the valuation. MOSERS' assessment of the significance of particular inputs to these fair value measurements requires judgment and considers factors specific to each asset or liability. The tables on pages 35-36 show the fair value leveling of the investments and additional information for investments valued at net asset value.

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

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

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

Investments and Derivative Instruments Measured at Fair Value

June 30, 2023	Total	Fair Value Measurement Using: Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Investment by fair value level				
Treasuries				
U.S. government securities	$ 4,310,367,441	$ 4,310,367,441	$ 0	$ 0
Fixed income securities				
Corporate bonds and asset-backed securities	202,730,246	0	202,711,658	18,588
U.S. government agencies	324,007	0	324,007	0
Non-U.S. sovereign	14,800,163	0	14,800,163	0
Municipal bonds	1,616,224	0	1,616,224	0
Total fixed income securities	219,470,640	0	219,452,052	18,588
Equity				
Real estate investment trusts	441,284,261	441,284,261	0	0
Equity mutual funds	337,664,886	337,664,886	0	0
Other equity securities	1,100,421	1,039,457	0	60,964
Total equities	780,049,568	779,988,604	0	60,964
Total investment by fair value level	5,309,887,649	5,090,356,045	219,452,052	79,552
Investments measured at the NAV				
Commingled funds - equity funds	827,902,556			
Commingled funds - investment grade fixed income funds	253,288,289			
Commingled funds - short-term investment funds	25,654,000			
Hedge funds	2,615,757,920			
Private equity and timber funds	939,964,931			
Private real estate	484,987,643			
Total investments measured at the NAV	5,147,555,339			
Total investments measured at fair value	10,457,442,988	5,090,356,045	219,452,052	79,552
Investment derivative instruments				
Future contracts	3,555,767			
Credit default swap contracts	2,752,821			
Total investment derivative instruments	6,308,588			
Investments at cost or amortized cost:				
Cash held in investment accounts	748,694,002			
Repurchase agreements	995,000,000			
Total investments at cost or amortized cost	1,743,694,002			
Total investments	12,207,445,578	5,090,356,045	219,452,052	79,552
Obligations under repurchase agreements	(3,603,920,038)			
Total investments, net of obligations under repurchase agreements	$ 8,603,525,540	$ 5,090,356,045	$ 219,452,052	$ 79,552

Investments Measured at the Net Asset Value

	June 30, 2023	Unfunded Commitments	Redemption Frequency (If Currently Eligible)	Redemption Notice Period (Days)
Commingled fund - equity funds	$ 827,902,556		Daily, Monthly	1-10
Commingled fund - investment grade fixed income funds	253,288,289		Daily	2
Commingled fund - short-term investment fund	25,654,000		Daily	0
Active hedge funds				
Merger arbitrage	105,580,732		Monthly	45
Equity market neutral	172,703,442		Quarterly	90
Event driven	260,338,858		Semi-annually	60
Quantitative	173,078,419		Monthly, Quarterly	30-60
Multi strategy	714,540,528		Monthly, Quarterly	60-90
Fund-of-funds	1,184,890,528		Monthly, Quarterly	10-95
Pending liquidated hedge funds	4,625,413			
Private equity and timber funds	939,964,931	$ 940,798,044		
Private real estate	484,987,643	15,229,402		
Total investments measured at the net asset value (NAV)	$ 5,147,555,339	$ 956,027,446		

- **Commingled fund - equity funds** – Five equity funds are considered to be commingled in nature. Each are valued at the NAV held at the end of the period based upon the fair value of the underlying investments.
- **Commingled fund - investment grade fixed income funds** – Three fixed income funds are considered to be commingled in nature and are valued at the NAV held at the end of the period based upon the fair value of the underlying investments.
- **Commingled fund - short term investment fund** – One short-term investment fund is considered to be commingled in nature and is valued at the NAV held at the end of the period based upon the fair value of the underlying investments.
- **Merger arbitrage hedge fund** – Consisting of one fund, this strategy invests in the common stock of companies that are involved in publicly announced mergers and seeks to generate attractive returns while dampening volatility. This investment is valued at the NAV, is redeemable monthly, and is not subject to lock-up restrictions.
- **Equity market neutral hedge fund** – Consisting of one fund, this strategy invests both long and short in U.S. and global equity securities, with the goal of having little to no net market exposure. This investment is valued at the NAV, is redeemable quarterly, and is not subject to lock-up restrictions.
- **Event driven hedge fund** – Consisting of one fund, this strategy seeks to gain an advantage from pricing inefficiencies that may occur in the onset or aftermath of a corporate action or related event. This investment is valued at the NAV, is redeemable semi-annually, and is not subject to lock-up restrictions.
- **Quantitative hedge funds** – Consisting of three funds, this strategy attempts to achieve uncorrelated returns using advanced statistical methods to select securities across liquid public markets and systematic volatility trading. These investments are valued at the NAV, are redeemable monthly or quarterly, and are not subject to lock-up restrictions.
- **Multi strategy hedge funds** – Consisting of five funds, these funds aim to pursue varying strategies in order to diversify risks and reduce volatility. These investments are valued at the NAV, are redeemable monthly or quarterly, but are subject to lock-up restrictions.
- **Fund-of-funds** – Consisting of four funds, these funds seek to provide diversification by holding a number of funds within a single fund structure. These investments are valued at the NAV, are redeemable monthly or quarterly, and are subject to liquidation of the underlying funds.

- **Pending liquidated hedge funds** – Consisting of eight funds which have been fully redeemed as of June 30, 2023, for which MOSERS is awaiting final distribution of the proceeds, which will be received upon sale of the underlying investments or upon completion of the audit of the firm's annual financial statements.
- **Private equity, timber, and real estate funds** – MOSERS' private equity portfolio consists of 43 funds with exposure to buyout funds, distressed funds, infrastructure, energy, secondary, royalty funds, and special situations. The real estate portfolio, comprised of 10 funds, invests mainly in U.S. commercial real estate. The timber portfolio consists of one fund in liquidation which invests in global timberland. The fair values of the majority of these funds have been determined using net assets valued one quarter in arrears plus current quarter cash flows. These funds are not eligible for redemption. Distributions are received as underlying investments when the funds are liquidated, which, on average, can occur over the span of five to 10 years.

Credit Risk

Credit risk is the risk that an issuer or other counterparty to an investment will not fulfill its obligations to MOSERS. As of June 30, 2023, MOSERS' fixed income assets that are not U.S. government guaranteed represented 25.9% of fixed income securities. In preparing this report, credit risk associated with all fixed income holdings, including collateral for repurchase agreements, has been included. The tables on the following page summarize MOSERS' fixed income security exposure levels and credit qualities.

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

Credit risk for derivative instruments held by the System results from counterparty risk assumed by MOSERS. This is essentially the risk that the counterparty to a MOSERS transaction will be unable to meet its obligation. Information regarding MOSERS' credit risk related to derivatives is found under the derivatives disclosures beginning on page 41 of the notes.

The commingled fund - investment grade fixed income funds are invested and reinvested primarily in a portfolio of U.S. dollar denominated investment grade securitized debt obligations, with the objective of approximating the total rate of return of the market for debt securities as defined by the *Bloomberg U.S. Securitized Index*. The average rating for the underlying securities within this fund is AA+.

Average Credit Quality and Exposure Levels of Nongovernment Guaranteed Securities

Fixed Income Security Type	Fair Value June 30, 2023	Percent of all Fixed Income Assets	Weighted Average Credit Quality	Ratings Dispersion Requiring Further Disclosure
U.S. government agencies	$ 350,664	0.0%	AA-	See below
U.S. government mortgages	27,491	0.0	AA+	See below
Asset-backed securities	7,354,888	0.1	AAA	See below
Collateralized mortgage obligations	296,515	0.0	AA+	See below
Corporate bonds	197,220,070	3.0	BBB+	See below
Municipal bonds	8,905,234	0.1	AA	See below
Non-U.S. sovereign	5,315,778	0.1	BBB+	See below
Total nongov't. guaranteed fixed income securities	219,470,640	3.3		
Nongov't. guaranteed repurchase agreements	450,000,000	6.9	Not rated	None
Bank deposits held in STIF account	750,000,000	11.4	FDIC insured	None
Commingled funds - investment grade fixed income	253,288,289	3.9	Not rated	None
Pooled instruments	25,654,000	0.4	AAA	None
Total nongov't. guaranteed securities	$ 1,698,412,929	25.9%		
U.S. government securities held in portfolio	$ 4,310,367,441	65.8%		
Repurchase agreement with U.S. government securities held as collateral	545,000,000	8.3		
Total fixed income securities	$ 6,553,780,370	100.0%		

Ratings Dispersion Detail - Fair Value

Credit Rating Level	U.S. Government Agencies	U.S. Government Mortgages	Asset-Backed Securities	Collateralized Mortgage Obligations	Corporate Bonds	Municipal Bonds	Non-U.S. Sovereign
AAA	$ 0	$ 0	$ 7,336,127	$ 0	$ 6,396,285	$ 1,985,176	$ 0
AA	350,664	27,491	0	296,515	6,554,343	4,524,337	788,116
A	0	0	0	0	75,957,768	2,287,510	1,555,507
BBB	0	0	0	0	105,920,827	108,211	2,972,155
BB	0	0	0	0	2,390,847	0	0
Not rated	0	0	18,761	0	0	0	0
	$ 350,664	$ 27,491	$ 7,354,888	$ 296,515	$197,220,070	$ 8,905,234	$ 5,315,778

Interest Rate Risk

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

MOSERS invests in mortgage-backed securities, which have embedded within them the option of being called, whereby the issuer has the option to keep the debt outstanding in rising interest rate environments or repay the debt in declining interest rate environments, a factor that advantages the issuer. This risk is incorporated within the effective duration calculation used in the interest rate risk analysis.

Effective Duration of Fixed Income Assets by Security Type

Fixed Income Security Type	Fair Value June 30, 2023	Percent of all Fixed Income Assets	Weighted Average Effective Duration (Years)	Interest Rate Risk Requiring Further Disclosure
U.S. treasuries	$ 4,310,367,441	65.8%	8.9	See below
U.S. government agencies	350,664	0.0	8.2	None
U.S. government mortgages	27,491	0.0	3.8	None
Asset-backed securities	7,354,888	0.1	2.4	None
Collateralized mortgage obligations	296,515	0.0	0.2	None
Corporate bonds	197,220,070	3.0	7.7	None
Municipal bonds	8,905,234	0.1	8.3	None
Non-U.S. sovereign	5,315,778	0.1	10.8	None
Bank deposits held in STIF account	750,000,000	11.4	0.0	None
Repurchase agreements	995,000,000	15.2	0.0	None
Commingled funds - investment grade fixed income	253,288,289	3.9	5.9	None
Pooled instruments	25,654,000	0.4	0.0	None
	$ 6,553,780,370	100.0%	6.3	

Effective Duration Analysis of U.S. Treasuries

Maturity	Fair Value June 30, 2023	Average Effective Duration of the Security Type (Years)	Contribution to Effective Duration (Years)
Less than 1 year to maturity	$ 202,285,501	0.3	0.0
1- to 10-year maturities	2,337,867,897	4.4	2.4
Long coupon treasuries	1,770,214,043	15.7	6.5
	$ 4,310,367,441		8.9

Repurchase Agreements

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

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

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

The yield earned by MOSERS on the repo transactions ranged from 1.50% to 5.17% with maturities of one to five days.

The yield earned by the counterparties on the reverse repo transactions ranged from 2.09% to 5.40% and had maturities of one month to one year. The maturities of the investments made with reverse repo proceeds generally have maturities of one to 30 years.

In repo transactions, MOSERS may have credit risk if the counterparty fails to repay the loan and the value of the securities held as collateral falls below the loan balance. To minimize this risk, MOSERS requires the financial institution to send collateral with a fair value greater than the value of the loan and revalues the collateral on a daily basis. As of fiscal year end, MOSERS held approximately $23.9 million of counterparty collateral in excess of the repo balance.

In a reverse repo transaction, MOSERS may be subject to credit risk if the counterparty fails to return the securities and the value of the securities held as collateral rise above the loan balance. To minimize this risk, MOSERS sends the minimum amount of collateral required by the financial institution and requires the financial institution to revalue the collateral and return excess collateral on a daily basis. Counterparties held approximately $2.5 million of MOSERS' collateral in excess of the reverse repo balance as of the end of the fiscal year.

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

Tri-Party Repurchase Agreements by Collateral Type

Collateral Type	Fair Value of Collateral June 30, 2023	Fair Value Including Accrued Interest of Repurchase Agreements June 30, 2023	Excess (Deficit) Collateral	Percent Over Collateralized
U.S. treasuries	$ 556,008,208	$ 545,000,000	$ 11,008,208	
U.S. government agencies	408,000,000	400,000,000	8,000,000	
Common stock	55,000,132	50,000,000	5,000,132	
Accrued interest	0	140,904	(140,904)	
	$ 1,019,008,340	$ 995,140,904	$ 23,867,436	2.4%

Reverse Repurchase Agreements by Collateral Type

Collateral Type	Fair Value of Collateral June 30, 2023	Fair Value Including Accrued Interest of Repurchase Agreements June 30, 2023	Excess (Deficit) Collateral	Percent Over Collateralized
U.S. treasuries	$ 3,645,574,344	$ 3,603,920,038	$ 41,654,306	
Payables	14,280,686	0	14,280,686	
Accrued interest	0	53,454,120	(53,454,120)	
	$ 3,659,855,030	$ 3,657,374,158	$ 2,480,872	0.1 %

Foreign Currency Risk

Foreign 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 MOSERS' exposure to foreign currencies for all assets that are held in custody at the System's custodial bank. MOSERS 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. MOSERS' exposure to foreign currency risk in U.S. dollars, as of June 30, 2023, is highlighted in the table below.

Currency Exposures by Asset Class

Currency	Cash & Cash Equivalents	Equities	Fixed Income	Total
Australian Dollar	$ 8,017,553	$ 0	$ 0	$ 8,017,553
Canadian Dollar	5,398,846	0	0	5,398,846
Euro	4,899,816	247,767	697,847	5,845,430
Hong Kong Dollar	(7,137,412)	0	0	(7,137,412)
Japanese Yen	(509,694)	1,891,326	(266,233)	1,115,399
South African Rand	(859,233)	0	0	(859,233)
South Korean Won	867,486	463,968	0	1,331,454
United Kingdom Pound Sterling	1,235,969	0	0	1,235,969
	$ 11,913,331	$ 2,603,061	$ 431,614	$ 14,948,006

Derivatives

Derivative instruments are financial contracts whose values depend on the values of one or more underlying assets, reference rates, or financial indexes. They include futures contracts, swap contracts, options contracts, and forward foreign currency exchange. The following tables summarize the various contracts in the portfolio as of June 30, 2023.

Futures Contracts

Futures Contract	Notional Value	Exposure
Currency futures	$ (3,652,519)	$ 898,335
Fixed income futures	(105,470,121)	1,240,677
Equity index futures	54,916,162	2,400,798
Commodity futures	(11,227,910)	(984,042)
Total	$ (65,434,388)	$ 3,555,768

Swap Contracts

Counterparty Credit Rating		Notional Value		Exposure
Total return swaps - equity				
A+	$	1,965,702,804	$	78,290,405
Total	$	1,965,702,804	$	78,290,405
Total return swaps - fixed income				
A+	$	537,139,959	$	(1,676,136)
A		126,077,525		0
Total	$	663,217,484	$	(1,676,136)
Total return swaps - commodities				
A+	$	304,095,365	$	0
A		120,957,507		0
Total	$	425,052,872	$	0

While the Board has no formal policy specific to derivatives, the MOSERS investment implementation program, through its external managers, holds investments in futures contracts and swap contracts. MOSERS enters into these certain derivative instruments as investments primarily to enhance the performance and reduce the volatility of its portfolio. It enters swaps and futures contracts to gain or hedge exposure to certain markets and to manage interest rate risk.

The notional values associated with these derivative instruments are generally not recorded in the financial statements; however, the fair values of these instruments are recorded in the *Statements of Fiduciary Net Position* and the total changes in fair value for the year are included as net appreciation in fair value of investments in the *Statements of Changes in Fiduciary Net Position*. For the year ended June 30, 2023, the change in fair value in the swap contracts resulted in a gain of $128 million of investment income. The change in fair value in the futures contracts resulted in a loss of $132 thousand of investment income. Foreign currency risk associated with derivative activities is included in the *Currency Exposures by Asset Class* table. MOSERS does not anticipate additional significant market risk from the derivative arrangements.

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

Securities Lending Program

The Board of Trustees' *Investment Policy Statement* permits the pension trust funds to participate in a securities lending program. Fixed income, international equity, and domestic equity securities of the pension trust funds are loaned to participating brokers who provide collateral in the form of cash, U.S. Treasury or government agency securities, or letters of credit issued by approved banks. Collateral must be provided in the amount of 102% of fair value for domestic loans and 105% of fair value for international loans. MOSERS does not have the authority to pledge or sell collateral securities, without borrower default.

There was no securities lending activity in fiscal year 2023.

Note 4 – Capital Assets

Office building, furniture, fixtures, equipment, and software costing $10,000 or more are capitalized. Capital assets are valued at cost and reported net of accumulated depreciation. Improvements, which increase the useful life of the property, are also capitalized. The cost of internally developed software incurred during the application development state, including staff payroll costs, are capitalized in accordance with GASB Statement No. 51. Maintenance and repairs are charged to expense as incurred. Depreciation is computed using the straight-line method over the estimated useful life of the related assets according to the following guidelines:

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

Schedules of the capital asset account balances for the year ended June 30, 2023, are as follows:

Capital Assets

	Right-to-Use Assets	CIP - Internally Developed Pension Admin. System	Building and Building Improvements *	Furniture, Fixtures and Equipment	Software	Total Capital Assets
Capital assets						
Balances June 30, 2022	$ 782,185	$ 10,726,125	$ 4,392,884	$ 2,118,631	$ 728,761	$ 18,748,586
Additions	596,178	959,276	82,787	0	0	1,638,241
Deletions	0	0	0	(2,237)	0	(2,237)
Capital assets June 30, 2023	1,378,363	11,685,401	4,475,671	2,116,394	728,761	20,384,590
Accumulated depreciation						
Balances June 30, 2022	190,195	0	2,246,613	1,349,819	724,152	4,510,779
Depreciation expense	406,540	0	104,309	215,840	526	727,215
Deletions	0	0	0	(2,237)	0	(2,237)
Accumulated depreciation June 30, 2023	596,735	0	2,350,922	1,563,422	724,678	5,235,757
Net capital assets June 30, 2023	$ 781,628	$ 11,685,401	$ 2,124,749	$ 552,972	$ 4,083	$ 15,148,833

** Building and Building Improvements includes $267,286 of land that the building is situated on.*

Capital Assets - Right-to-Use Assets

	Right-to-Use Assets Buildings	Right-to-Use Assets Software	Total Right-to-Use Assets
Right-to-use assets			
Balances June 30, 2022	$ 278,312	$ 503,873	$ 782,185
Additions	0	596,178	596,178
Right-to-use assets June 30, 2023	278,312	1,100,051	1,378,363
Accumulated depreciation			
Balances June 30, 2022	36,606	153,589	190,195
Depreciation expense	89,223	317,317	406,540
Accumulated depreciation June 30, 2023	125,829	470,906	596,735
Net right-to-use assets June 30, 2023	$ 152,483	$ 629,145	$ 781,628

Right-to-Use Assets

Right-to-use assets consist of leased office space and subscription-based software. The intangible right-to-use assets and related liabilities are recorded under GASB Statement No. 87, *Leases*, and GASB Statement No. 96, *Subscription-Based Information Technology Arrangements*. The capitalized value of right-to-use assets and lease liabilities has been calculated based on the future lease payments, discounted to present value. Accounting standards require organizations to determine their discount rate based on their incremental borrowing costs. As an institutional investor, treasury rates were the primary factor MOSERS used to determine a discount rate for the purpose of present valuing right-to-use assets and lease liabilities. MOSERS used a 4% discount rate to calculate the present value of the lease liabilities recognized during the fiscal year ended June 30, 2023. The difference between the liability booked to record the present value of these future payment obligations, and the actual lease payments, is reported as interest expense.

The recording of these liabilities resulted in a future minimum lease commitment, as follows:

Schedule of Minimum Lease Commitments

	Building			Software		
Year Ended June 30	Principal	Imputed Interest	Total	Principal	Imputed Interest	Total
2024	$ 94,834	$ 3,288	$ 98,122	$ 295,208	$ 22,158	$ 317,366
2025	57,649	578	58,227	171,896	13,149	185,045
2026	0	0	0	162,041	6,482	168,523
Total commitments	$ 152,483	$ 3,866	$ 156,349	$ 629,145	$ 41,789	$ 670,934

The changes in the lease liability amounts are reported in the following table:

Schedule of Changes in Lease Liability Amount

	Right-to-Use Assets Buildings	Right-to-Use Assets Software	Total Right-to-Use Assets
Balances June 30, 2022	$ 241,706	$ 350,284	$ 591,990
Increases to liability	0	596,178	596,178
Decreases from liability	(89,223)	(317,317)	(406,540)
Net capital assets June 30, 2023	$ 152,483	$ 629,145	$ 781,628

Note 5 – Employers' Net Pension Liability

The components of net pension liability as of June 30, 2023, are in the *Schedule of Employers' Net Pension Liability* below.

Schedule of Employers' Net Pension Liability

	MSEP	Judicial Plan
Total pension liability	$ 16,190,813,686	$ 654,242,323
MOSERS' fiduciary net position	8,557,793,248	190,226,755
Employers' net pension liability	$ 7,633,020,438	$ 464,015,568
Plan net position as a percentage of the total pension liability	52.86%	29.08%
Covered payroll	$ 2,211,853,954	$ 64,923,979
Employers' net pension liability as a percentage of covered payroll	345.10%	714.71%

An actuarial valuation of an ongoing plan involves estimates of the reported amounts and assumptions about the probability of occurrence of events far into the future. Examples include assumptions about future employment, mortality, and future salary increases. Amounts determined regarding the net pension liability are subject to continual revision as actual results are compared with past expectations and new estimates are made about the future. The *Schedule of Changes in Employers' Net Pension Liability* presents multi-year trend information about whether the plan fiduciary net positions are increasing or decreasing over time relative to the total pension liability. These schedules are presented in the *Required Supplementary Information.* The total pension liability, as of June 30, 2023, is $16,190,813,686 for the MSEP and $654,242,323 for the Judicial Plan based on an actuarial valuation performed as of June 30, 2023, and a measurement date of June 30, 2023, using generally accepted actuarial procedures.

Actuarial Assumptions Used to Determine Net Pension Liability

An actuarial experience study covering the five-year period ended June 30, 2020, was performed in 2021. A summary of the assumptions used to calculate the net pension liability is contained in the table below.

Summary of Actuarial Assumptions for the MSEP & the Judicial Plan Used to Determine Net Pension Liability

Valuation date	June 30, 2023
Actuarial cost method	Entry Age Normal
Asset valuation method	Fair value
Investment rate of return, net of investment expense	6.95 %
Projected salary increases	2.75 – 10.00% (MSEP) 3.00% (Judicial Plan)
Rate of payroll growth	2.25 %
COLAs	4% or 1.80% *
Price inflation	2.25%

* 4.00% compounded annually, when a minimum COLA of 4.00% is in effect. 1.80% compounded annually, when no minimum COLA is in effect (80% of price inflation).

Mortality Rates - MSEP

Pre-retirement mortality rates were based on the Pub-2010 General Members Below Median Employee mortality table, set back two years for males and set forward one year for females. Mortality was projected generationally from 2010 to 2020 using Scale MP-2020 and 75% of Scale MP-2020 for years after 2020.

Post-retirement mortality rates for retirees were based on the Pub-2010 General Members Below Median Healthy Retiree mortality table, scaled by 104%, set back two years for males and set forward one year for females. Mortality projected generationally from 2010 to 2020 using Scale MP-2020 and 75% of Scale MP-2020 for years after 2020.

Post-retirement mortality rates for beneficiaries were based on the Pub-2010 General Members Below Median Contingent Survivor mortality table, set back two years for males and set forward one year for females. Mortality was projected generationally from 2010 to 2020 using Scale MP-2020 and 75% of Scale MP-2020 for years after 2020.

Disabled mortality rates were based on the Pub-2010 Non-Safety Disabled Retiree mortality table, without mortality projection.

Mortality Rates - Judicial Plan

Pre-retirement mortality rates were based on the Pub-2010 General Members Median Employee mortality table. Mortality was projected generationally from 2010 to 2020 using Scale MP-2020 and 75% of Scale MP-2020 for years after 2020.

Post-retirement mortality rates for retirees were based on the Pub-2010 General Members Median Healthy Retiree mortality table. Mortality was projected generationally from 2010 to 2020 using Scale MP-2020 and 75% of Scale MP-2020 for years after 2020.

Post-retirement mortality rates for beneficiaries were based on the Pub-2010 General Members Median Contingent Survivor mortality table. Mortality was projected generationally from 2010 to 2020 using Scale MP-2020 and 75% of Scale MP-2020 for years after 2020.

Discount Rate

The discount rate used to measure the total pension liability was 6.95%, net of investment expenses. The projection of cash flows used to determine the discount rate assumed that contributions from participating employers will be made using the actuarially determined rates. Based on those assumptions, MOSERS' fiduciary net position was projected to be available to make all the projected future benefit payments of the current plan members. As a result, the long-term expected rate of return on pension plan investments, net of investment expense, of 6.95% was applied to all periods of projected benefit payments to determine the total pension liability.

The table below presents the net pension liability of the plans, as of June 30, 2023, calculated using the discount rate of 6.95%, as well as what the net pension liability would be if it were calculated using a discount rate that is 1% lower (5.95%) or 1% higher (7.95%) than the current rate.

Sensitivity of Net Pension Liability to Changes in the Discount Rate

Employers' Net Pension Liability	1% Decrease 5.95%	Current Discount Rate 6.95%	1% Increase 7.95%
MSEP	$ 9,514,936,218	$ 7,633,020,438	$ 6,060,958,468
Judicial Plan	$ 527,860,952	$ 464,015,568	$ 409,270,520

The funding status of the plans and *Employer Schedule of Funding Progress* can be found in the *Actuarial Section* on page 99.

Note 6 – Retiree Life Insurance and Long-Term Disability Insurance Programs

In addition to the defined benefit pension provided through MOSERS, the state of Missouri also funds, either partially or in its entirety, retiree life insurance, and long-term disability insurance programs for eligible members. These insurance programs are underwritten by The Standard. MOSERS collects premiums for participants of these programs and remits them to the The Standard on behalf on the state of Missouri.

Retiree Life Insurance

Members who retire on or after October 1, 1985, are eligible for $5,000 of state-sponsored basic life insurance coverage if they retire directly from active employment. As of June 30, 2023, 30,139 retirees were participating in the program. This insured defined benefit coverage is financed on a percentage of payroll (.115%) and is purchased as a group policy through The Standard. The cost for the year ended June 30, 2023, was $2,175,731. Premiums are contributed entirely by the state and its component employers as provided by Section 104.515, RSMo.

Retirees of the Department of Labor and Industrial Relations (DOLIR), who retired prior to January 1, 1996, are eligible for state-sponsored insured defined benefit insurance coverage in the same amount of coverage they were receiving through the DOLIR. As of June 30, 2023, 73 retirees were participating in the program. The coverage for this closed group is purchased as a group policy at a current cost of $2.07 per thousand dollars of coverage, per month, per eligible participant ($9,085 for the year ended June 30, 2023). Premiums are paid entirely by the DOLIR as provided by Section 288.225, RSMo. Retirees of the DOLIR who retired on or after January 1, 1996, are eligible for $5,000 of state-sponsored life insurance coverage if they retire directly from active employment. They are included in the group described in the preceding paragraph.

Long-Term Disability Insurance (LTD)

MOSERS provides LTD coverage for eligible members and generally includes those active members of MOSERS' retirement plans who do not have other disability coverage and are not yet eligible to receive normal (unreduced) retirement benefits.

There were 31,232 members covered under the program as of June 30, 2023. This insured defined benefit coverage is financed on a percentage of covered payroll (0.0445%). Purchased as a group policy, LTD is administered by The Standard. The cost for the year ended June 30, 2023, was $7,654,825. Premiums are contributed by the state and its component employers, as provided for by Section 104.515, RSMo.

Note 7 – MCHCP Post-Employment Retiree Health Care OPEB Program

MOSERS participates as an employer in a cost-sharing, multiple-employer, defined benefit, other post-employment benefits plan, the State Retiree Welfare Benefit Trust (SRWBT), operated by Missouri Consolidated Health Care Plan (MCHCP). Employees may participate at retirement if eligible to receive a monthly retirement benefit from MOSERS. The terms and conditions governing post-employment benefits are vested with the MCHCP Board of Trustees within the authority granted under Chapter 103, Sections 103.003 through 103.178, RSMo. The SRWBT does not issue a separate stand-alone financial report. Financial activity of the SRWBT is included in the *MCHCP Annual Comprehensive Financial Report* as a fiduciary fund and is intended to present only the financial position of the activities attributable to the SRWBT. Additionally, MCHCP is considered a component unit of the state of Missouri reporting entity and is included in the state's financial report.

The Plan's financial statements are available on the MCHCP's website at *www.mchcp.org*.

Benefits

The SRWBT was established and organized on June 27, 2008, pursuant to Sections 103.003 through 103.178, RSMo, to provide health and welfare benefits for the exclusive benefit of current and future retired employees of the state and their dependents who meet eligibility requirements, except for those retired members covered by other OPEB plans of the state. The three medical plans from MCHCP offer the same basic coverage such as preventative care, freedom to choose care from a nationwide network of primary care providers, specialists, pharmacies, and hospitals, usually at a lower negotiated group discount and the same covered benefits for both medical and pharmacy. Benefits are the same in all three plans; other aspects differ such as premium, deductible, and out-of-pocket costs. Retiree benefits are the same as for active employees, until they are Medicare eligible.

Contributions

Contributions are established, and may be amended by the MCHCP Board of Trustees, with the authority granted under Chapter 103, Sections 103.003 through 103.178, RSMo. For the fiscal year ended June 30, 2022, employers were required to contribute 4.34% of gross active employee payroll for the period July 1, 2021, through December 31, 2021, and 4.29% for the period January 1, 2022, through June 30, 2022. Employees do not contribute to this plan.

OPEB Liabilities, OPEB Expense, Deferred Outflows of Resources, and Deferred Inflows of Resources

At June 30, 2023, MOSERS reported a liability of $5,635,287 for its proportionate share of the net OPEB liability. The net OPEB liability was measured as of June 30, 2022, and the total OPEB liability used to calculate the net OPEB liability was determined by an actuarial valuation as of that date. MOSERS' proportion of the net OPEB liability was based on a projection of its long-term share of contributions to the OPEB plan relative to the projected contributions of all participating entities, actuarially determined. At June 30, 2022, MOSERS' proportionate share was 0.4000%. For the year ended June 30, 2023, MOSERS recognized a net increase in administrative costs of $241,294 related to OPEB expense. As of June 30, 2023, MOSERS reported deferred outflows of resources and deferred inflows of resources as follows:

Deferred Outflows/Inflows of Resources Related to Post-Employment Retiree Health Care

	Deferred Outflows of Resources	Deferred Inflows of Resources
Difference between expected and actual experience	$ 235,653	$ 55,644
Changes of assumptions	0	1,984,764
Net difference between projected and actual earnings on plan investments	51,299	0
Changes in proportion and differences between MOSERS' contributions and proportionate share of contributions	504,826	216,585
MOSERS' contributions subsequent to the measurement date	286,406	0
	$ 1,078,184	$ 2,256,993

The $286,406 currently reported as deferred outflows of resources related to OPEB resulting from MOSERS' contributions subsequent to the measurement date will be recognized as a reduction of the net OPEB liability in the year ended June 30, 2024. Other amounts reported as deferred inflows of resources related to OPEB will be recognized in OPEB expense as follows:

Deferred Outflows/Inflows of Resources Related to Post-Employment Retiree Health Care to be Recognized in Future Years

Year Ending June 30		
2024	$	223,242
2025		224,105
2026		227,356
2027		212,565
2028		233,219
Thereafter		344,728
Total	$	1,465,215

Actuarial Assumptions

The collective total OPEB liability for the June 30, 2022, measurement date was determined by an actuarial valuation as of July 1, 2022. This actuarial valuation used the following actuarial assumptions:

Summary of MCHCP's Actuarial Assumptions for Post-Employment Retiree Health Care

Valuation year	July 1, 2021 - June 30, 2022
Actuarial cost method	Entry age normal, level percentage of payroll
Asset valuation method	Fair value
Discount rate	5.50%
Projected payroll growth rate	4.0%
Inflation rate	3.0%
Health care cost trend rate (medical & prescription drugs combined)	
Non-Medicare	6.5% *
	* (6.50% in fiscal 2023 through 2025, then decreases by 0.25% per year until an ultimate rate of 5.0% in fiscal year 2031 and later)
Medicare	14.50% **
	** (rate changes to 15.0% in fiscal year 2024, 11.5% in fiscal 2025, 10.5% in fiscal 2026, then decreases by 0.75% per year to a rate of 5.25% in fiscal 2033, then 5.0% in fiscal 2034 and after.)

Mortality: *Pre-Retirement*: Pri-2012 Employee Amount-weighted Mortality Table projected generationally using MP-2021.
Annuitant: Pri-2012 Retiree Amount-weighted Mortality Table projected generationally using MP-2021.

The last experience study was conducted in 2020. Termination rates and retirement rates are updated based on an experience study conducted in 2020. Participation and dependent coverage assumptions were updated based upon an experience study conducted in July 2020. Per capita claims costs, administrative expenses, and retiree contributions were updated based on analysis of 2023 rates.

Change in Assumptions and Methods Since Prior Valuation

The discount rate was changed to 5.50% from 4.50%. Per capita health costs, administrative expenses, and retiree contributions were updated based on an analysis of 2023 rates. Trend rates were updated based on anticipated future experience.

Sensitivity to Changes in the Health Care Cost Trend Rates

The following table presents MOSERS' net OPEB liability, calculated using the current trend rate, as well as what the net OPEB liability would be if it were calculated using a trend rate that is one percent lower or one percent higher:

Sensitivity of the Net MCHCP OPEB Liability to Changes in Health Care Cost Trend Rates

	1% Decrease in Trend Rates	Current Trend Rates	1% Increase in Trend Rates
Net OPEB liability	$ 4,815,264	$ 5,635,287	$ 6,655,333

Discount Rate

A discount rate of 5.5% was used to measure the total OPEB liabilities. The projection of cash flows used to determine the discount rate assumed that contributions from plan members will be made at the current contribution rates and the contributions will be made at statutorily required rates, actuarially determined. This discount rate was determined as the best estimate of the expected return on plan assets as of the measurement date.

Sensitivity to Changes in the MCHCP Discount Rate

The following table presents MOSERS' net OPEB liability, calculated using a discount rate of 5.5%, as well as what the net OPEB liability would be if it were calculated using a discount rate that is one percent lower or one percent higher:

Sensitivity of the Net MCHCP OPEB Liability to Changes in Discount Rate

	1% Decrease in Discount Rate (4.5%)	Current Discount Rate (5.5%)	1% Increase in Discount Rate (6.5%)
Net OPEB liability	$ 6,642,789	$ 5,635,287	$ 4,826,223

Long-Term Expected Rate of Return

The target allocation and expected real rate of return for each major asset class are listed below:

MCHCP's Long-Term Expected Rate of Return

Asset Class	Target Allocation	Expected Real Rate of Return
Large cap stocks	19.0%	8.5%
Mid cap stocks	6.0	8.8
Small cap stocks	9.0	8.8
International stocks	5.0	9.0
BarCap aggregate bonds	59.0	3.9
Cash equivalents	2.0	2.8

Note 8 – Commitments

As of June 30, 2023, MOSERS has $956.0 million in unfunded commitments in the private asset class.

MOSERS has contracted with various software and consulting firms to provide and implement a pension administration system at a cost of approximately $10.3 million. In addition to the cost of the system, MOSERS has engaged consultants to assist with project governance, change management, and data validation. The contracts for these consulting services have an approximate cost of $2.8 million. As of June 30, 2023, the remaining commitments on these agreements was approximately $3.3 million.

Note 9 – Contingencies

There were no contingencies which would have a material impact on the financial statements as of June 30, 2023.

Note 10 – Risk Management

MOSERS is exposed to various risks of loss related to natural disasters, errors and omissions, loss of assets, torts, etc. MOSERS has chosen to cover such losses through the purchase of commercial insurance to help mitigate some of the exposure to those risks. In the previous three years, MOSERS has not experienced any losses that exceeded our insurance coverage limits.

Schedule of Changes in Employers' Net Pension Liability - MSEP

Last Ten Fiscal Years

	2023	2022	2021	2020	2019
Total pension liability					
Service cost	$ 166,052,284	$ 166,110,518	$ 162,668,072	$ 159,559,528	$ 158,190,866
Interest on the total pension liability	1,037,223,987	1,017,493,541	959,662,398	960,644,327	956,725,536
Benefit changes	0	0	0	0	0
Difference between expected and actual experience	570,092,422	77,335,262	133,886,066	(70,371,777)	7,426,685
Assumption changes	0	0	515,859,705	124,766,739	74,340,841
Benefit payments and member refunds	(991,550,039)	(962,590,826)	(919,838,592)	(873,816,238)	(851,821,580)
Net change in total pension liability	781,818,654	298,348,495	852,237,649	300,782,579	344,862,348
Total pension liability - beginning	15,408,995,032	15,110,646,537	14,258,408,888	13,957,626,309	13,612,763,961
Total pension liability - ending (a)	$16,190,813,686	$15,408,995,032	$15,110,646,537	$14,258,408,888	$13,957,626,309
Plan fiduciary net position					
Employer contributions	$ 1,080,661,379	$ 471,302,256	$ 463,293,368	$ 436,895,653	$ 394,150,042
Employee contributions	48,487,731	39,809,873	37,571,263	35,141,960	31,286,632
Pension plan net investment income (loss)	177,598,790	(816,407,543)	2,032,991,086	400,354,303	313,159,178
Benefit payments and member refunds	(991,550,039)	(962,590,826)	(919,838,592)	(873,816,238)	(851,821,580)
Pension plan administrative expense	(10,984,550)	(9,248,916)	(8,816,943)	(8,398,164)	(9,200,826)
Other	5,165,340	5,619,673	3,899,365	4,187,740	4,383,409
Net change in plan fiduciary net position	309,378,651	(1,271,515,483)	1,609,099,547	(5,634,746)	(118,043,145)
Plan fiduciary net position - beginning	8,248,414,597	9,519,930,080	7,910,830,533	7,916,465,279	8,034,508,424
Plan fiduciary net position - ending (b)	8,557,793,248	8,248,414,597	9,519,930,080	7,910,830,533	7,916,465,279
Net pension liability - ending (a)-(b)	$ 7,633,020,438	$ 7,160,580,435	$ 5,590,716,457	$ 6,347,578,355	$ 6,041,161,030
Plan fiduciary net position as a percentage of total pension liability	52.86%	53.53%	63.00%	55.48%	56.72%
Covered payroll	$ 2,211,853,954	$ 2,004,688,456	$ 2,024,883,601	$ 2,006,870,248	$ 1,950,272,350
Net pension liability as a percentage of covered payroll	345.10%	357.19%	276.10%	316.29%	309.76%

See accompanying *Notes to the Schedules of Required Supplementary Information - Pension Trust Funds.*

Schedule of Changes in Employers' Net Pension Liability - MSEP (continued)

Last Ten Fiscal Years

	2018	2017	2016	2015	2014
Total pension liability					
Service cost	$ 157,351,979	$ 152,766,134	$ 149,021,755	$ 150,412,577	$ 158,116,026
Interest on the total pension liability	956,201,619	945,654,398	913,877,923	896,451,618	869,878,195
Benefit changes	0	(1,696,059)	0	0	0
Difference between expected and actual experience	(118,252,032)	(104,203,260)	61,150,083	(27,983,267)	12,376,237
Assumption changes	351,899,973	202,554,786	656,805,085	(57,568,553)	0
Benefit payments and member refunds	(886,711,473)	(793,964,857)	(757,310,503)	(728,265,800)	(680,436,107)
Net change in total pension liability	460,490,066	401,111,142	1,023,544,343	233,046,575	359,934,351
Total pension liability - beginning	13,152,273,895	12,751,162,753	11,727,618,410	11,494,571,835	11,134,637,484
Total pension liability - ending (a)	$13,612,763,961	$13,152,273,895	$12,751,162,753	$11,727,618,410	$11,494,571,835
Plan fiduciary net position					
Employer contributions	$ 379,557,962	$ 335,217,422	$ 329,957,369	$ 329,752,832	$ 326,370,336
Employee contributions	28,303,994	25,439,343	21,684,920	18,099,455	14,025,328
Pension plan net investment income (loss)	576,188,826	272,595,668	1,740,269	(237,070,529)	1,193,952,121
Benefit payments and member refunds	(886,711,473)	(793,964,857)	(757,310,503)	(728,265,800)	(680,436,107)
Pension plan administrative expense	(9,799,256)	(8,759,341)	(8,489,375)	(8,077,692)	(7,336,922)
Other	1,610,073	5,668,849	4,923,622	5,434,820	296,369,500
Net change in plan fiduciary net position	89,150,126	(163,802,916)	(407,493,698)	(620,126,914)	1,142,944,256
Plan fiduciary net position - beginning	7,945,358,298	8,109,161,214	8,516,654,912	9,136,781,826	7,993,837,570
Plan fiduciary net position - ending (b)	8,034,508,424	7,945,358,298	8,109,161,214	8,516,654,912	9,136,781,826
Net pension liability - ending (a)-(b)	$ 5,578,255,537	$ 5,206,915,597	$ 4,642,001,539	$ 3,210,963,498	$ 2,357,790,009
Plan fiduciary net position as a percentage of total pension liability	59.02%	60.41%	63.60%	72.62%	79.49%
Covered payroll	$ 1,951,454,817	$ 1,975,353,105	$ 1,921,528,936	$ 1,918,527,768	$ 1,902,719,928
Net pension liability as a percentage of covered payroll	285.85%	263.59%	241.58%	167.37%	123.92%

See accompanying *Notes to the Schedules of Required Supplementary Information - Pension Trust Funds.*

Schedule of Changes in Employers' Net Pension Liability - Judicial Plan

Last Ten Fiscal Years

	2023	2022	2021	2020	2019
Total pension liability					
Service cost	$ 13,037,787	$ 13,303,763	$ 12,872,644	$ 13,119,646	$ 13,573,453
Interest on the total pension liability	42,246,794	42,073,646	42,004,675	42,458,800	41,710,768
Benefit changes	0	0	0	0	0
Difference between expected and actual experience	14,023,318	(9,088,237)	(6,886,109)	(14,933,643)	978,884
Assumption changes	0	0	(4,928,456)	6,341,771	5,024,057
Benefit payments and member refunds	(45,108,589)	(42,530,378)	(41,625,546)	(39,622,268)	(37,593,049)
Net change in total pension liability	24,199,310	3,758,794	1,437,208	7,364,306	23,694,113
Total pension liability - beginning	630,043,013	626,284,219	624,847,011	617,482,705	593,788,592
Total pension liability - ending (a)	$ 654,242,323	$ 630,043,013	$ 626,284,219	$ 624,847,011	$ 617,482,705
Plan fiduciary net position					
Employer contributions	$ 39,064,758	$ 39,228,848	$ 39,996,509	$ 39,174,515	$ 38,604,668
Employee contributions	1,746,913	1,550,712	1,448,428	1,314,570	1,138,101
Pension plan net investment income (loss)	4,165,663	(18,801,946)	44,049,707	8,162,709	6,051,941
Benefit payments	(45,108,589)	(42,530,378)	(41,625,546)	(39,622,268)	(37,593,049)
Pension plan administrative expense	(91,076)	(79,492)	(75,822)	(74,450)	(72,141)
Other	0	0	0	0	3,895
Net change in plan fiduciary net position	$ (222,331)	$ (20,632,256)	$ 43,793,276	$ 8,955,076	$ 8,133,415
Plan fiduciary net position - beginning	190,449,086	211,081,342	167,288,066	158,332,990	150,199,575
Plan fiduciary net position - ending (b)	190,226,755	190,449,086	211,081,342	167,288,066	158,332,990
Net pension liability - ending (a)-(b)	$ 464,015,568	$ 439,593,927	$ 415,202,877	$ 457,558,945	$ 459,149,715
Plan fiduciary net position as a percentage of total pension liability	29.08%	30.23%	33.70%	26.77%	25.64%
Covered payroll	$ 64,923,979	$ 63,333,626	$ 63,105,884	$ 61,402,061	$ 60,594,362
Net pension liability as a percentage of covered payroll	714.71%	694.09%	657.95%	745.18%	757.74%

See accompanying *Notes to the Schedules of Required Supplementary Information - Pension Trust Funds.*

Schedule of Changes in Employers' Net Pension Liability - Judicial Plan (continued)
Last Ten Fiscal Years

	2018	2017	2016	2015	2014
Total pension liability					
Service cost	$ 12,997,198	$ 12,945,567	$ 10,932,097	$ 10,613,686	$ 8,990,293
Interest on the total pension liability	41,018,371	40,617,091	37,755,240	36,161,612	34,013,615
Benefit changes	0	0	0	0	0
Difference between expected and actual experience	(1,319,696)	(10,687,091)	(5,036,696)	5,103,664	13,360,614
Assumption changes	12,332,042	7,905,466	53,991,379	0	0
Benefit payments and member refunds	(35,657,248)	(33,984,725)	(32,989,714)	(31,245,906)	(29,406,625)
Net change in total pension liability	29,370,667	16,796,308	64,652,306	20,633,056	26,957,897
Total pension liability - beginning	564,417,925	547,621,617	482,969,311	462,336,255	435,378,358
Total pension liability - ending (a)	$ 593,788,592	$ 564,417,925	$ 547,621,617	$ 482,969,311	$ 462,336,255
Plan fiduciary net position					
Employer contributions	$ 36,892,203	$ 34,246,826	$ 33,642,498	$ 32,696,686	$ 29,264,877
Employee contributions	902,319	786,745	661,206	488,193	294,810
Pension plan net investment income (loss)	10,677,666	4,680,131	28,081	(3,610,352)	17,199,701
Benefit payments	(35,657,248)	(33,984,725)	(32,989,714)	(31,245,906)	(29,406,625)
Pension plan administrative expense	(181,595)	(150,387)	(136,983)	(123,015)	(105,693)
Other	(68,711)	0	0	0	4,195,049
Net change in plan fiduciary net position	$ 12,564,634	$ 5,578,590	$ 1,205,088	$ (1,794,394)	$ 21,442,119
Plan fiduciary net position - beginning	137,634,941	132,056,351	130,851,263	132,645,657	111,203,538
Plan fiduciary net position - ending (b)	150,199,575	137,634,941	132,056,351	130,851,263	132,645,657
Net pension liability - ending (a)-(b)	$ 443,589,017	$ 426,782,984	$ 415,565,266	$ 352,118,048	$ 329,690,598
Plan fiduciary net position as a percentage of total pension liability	25.30%	24.39%	24.11%	27.09%	28.69%
Covered payroll	$ 59,417,302	$ 58,591,661	$ 57,421,016	$ 55,656,457	$ 49,587,936
Net pension liability as a percentage of covered payroll	746.57%	728.40%	723.72%	632.66%	664.86%

See accompanying *Notes to the Schedules of Required Supplementary Information - Pension Trust Funds.*

Pension Trust Funds

Schedules of Employer Contributions

Last Ten Fiscal Years

MSEP

Year Ended June 30	Actuarially Determined Contribution	Contributions in Relation to the Actuarially Determined Contribution*	Contribution Deficiency (Excess)	Covered Payroll**	Contributions as a Percentage of Covered Payroll
2023	$ 580,661,379	$ 1,080,661,379	$ (500,000,000)	$ 2,211,853,954	48.86% ***
2022	471,302,256	471,302,256	0	2,004,688,456	23.51
2021	463,293,368	463,293,368	0	2,024,883,601	22.88
2020	436,895,653	436,895,653	0	2,006,870,248	21.77
2019	394,150,042	394,150,042	0	1,950,272,350	20.21
2018	379,557,962	379,557,962	0	1,951,454,817	19.45
2017	322,772,697	335,217,422	(12,444,725)	1,975,353,105	16.97
2016	310,124,928	329,957,369	(19,832,414)	1,921,528,936	16.97
2015	329,752,832	329,752,832	0	1,918,527,768	16.97
2014	326,370,336	326,370,336	0	1,902,719,928	16.98

Judicial Plan

Year Ended June 30	Actuarially Determined Contribution	Contributions in Relation to the Actuarially Determined Contribution*	Contribution Deficiency (Excess)	Covered Payroll**	Contributions as a Percentage of Covered Payroll
2023	$ 39,064,758	$ 39,064,758	$ 0	$ 64,923,979	60.17%
2022	39,228,848	39,228,848	0	63,333,626	61.94
2021	39,996,509	39,996,509	0	63,105,884	63.38
2020	39,174,515	39,174,515	0	61,402,061	63.80
2019	38,604,668	38,604,668	0	60,594,362	63.71
2018	36,892,203	36,892,203	0	59,417,302	62.09
2017	32,670,710	34,246,826	(1,576,116)	58,591,661	58.45
2016	31,604,527	33,642,498	(2,037,971)	57,421,016	58.45
2015	32,696,686	32,696,686	0	55,656,457	58.45
2014	29,264,877	29,264,877	0	49,587,936	59.69

* *Since the percent of payroll contributions rate was applied to the pension payroll during the fiscal year, the actuarially determined contribution is equal to the actual contribution. In fiscal years 2016 and 2017, excess contributions were made because the actuarially determined contribution rate fell below the Board-established minimum contribution rate.*

** *For fiscal years 2016 and prior, covered payroll totals from the valuation report were used, which includes actual covered payroll from July through May with estimated amounts for June. For fiscal years 2017 and forward, covered payroll totals used are actual covered payroll from July through June, as reported in the GASB 67 report.*

*** *Beginning in fiscal year 2023, the employers were given the option to prepay contributions at certain times during the year and receive an actuarially determined present value discount based on MOSERS' investment return assumption. During fiscal year 2023 MOSERS received a one-time contribution of $500 million from the state of Missouri.*

See accompanying *Notes to the Schedules of Required Supplementary Information - Pension Trust Funds.*

Pension Trust Funds

Schedule of Annual Money-Weighted Rate of Return on Investments

Last Ten Fiscal Years

Year Ended June 30	Annual Money-Weighted Rate of Return - Net of Investment Expense
2023	2.13 %
2022	(8.75)
2021	26.56
2020	5.25
2019	4.10
2018	7.57
2017	3.51
2016	0.08
2015	(2.60)
2014	19.25

See accompanying *Notes to the Schedules of Required Supplementary Information - Pension Trust Funds.*

Notes to the Schedules of Required Supplementary Information - Pension Trust Funds

Actuarial Methods and Assumptions for Valuations Performed as of June 30, 2023

The entry age normal actuarial cost method of valuation is used in determining liabilities and normal cost. Regular actuarial valuations provide valuable information about the composite change in the unfunded actuarial accrued liabilities (whether or not the liabilities are increasing or decreasing, and by how much). Since the future cannot be predicted with precision, actual experience is expected to differ from assumed experience. Differences occurring in the past between assumed experience and actual experience (actuarial gains and losses) become part of actuarial accrued liabilities. Unfunded actuarial accrued liabilities are amortized to produce payments (principal and interest), which are expressed as a percent of payroll. A layered, closed 25-year amortization period was used for the June 30, 2023, valuations to determine the fiscal year 2025 contribution rates. The actuarial value is calculated by recognizing the difference between the actual and expected return on the fair value of assets each year over a closed five-year period. In addition, the total unrecognized investment experience as of June 30, 2017, will be recognized evenly over a seven-year period beginning June 30, 2018.

The investment return rate assumption remained constant at 6.95% per year, as of June 30, 2023, compounded annually (net of investment expenses). The price inflation assumption used was 2.25% per year. Projected salary assumptions were 2.75% to 10.00% for the MSEP and 3.00% for the Judicial Plan. The assumption used for annual post-retirement benefit increases (COLAs) is 4.0% (on a compound basis) when a minimum COLA is in effect. When no minimum COLA is in effect, the annual COLA is assumed to be 1.80% (80% of the 2.25% price inflation), on a compounded basis.

Actuarial Assumptions and Methods Used to Set the Actuarially Determined Contributions - Five-Year Review

MSEP & Judicial

Valuation year	2023	2022	2021	2020	2019
Contribution rate for fiscal year	2025	2024	2023	2022	2021
Actuarial cost method	Entry Age Normal	Entry Age Normal	Entry Age Normal	Entry Age Normal	Entry Age Normal
Amortization method	Layered bases approach - Level percentage of payroll	Layered bases approach - Level percentage of payroll	Layered bases approach - Level percentage of payroll	Layered bases approach - Level percentage of payroll	Layered bases approach - Level percentage of payroll
Amortization periods	Closed 25-year period	Closed 25-year period	Closed 25-year period	Closed 30-year period	Closed 30-year period
Inflation	2.25%	2.25%	2.25%	2.25%	2.35%
Cost-of-living adjustment	4% or 1.80%	4% or 1.80%	4% or 1.80%	4% or 1.80%	4% or 1.88%
Salary increase	varied	varied	3.00	varied	varied
Payroll growth	2.25%	2.25%	2.25%	2.25%	2.35%
Investment rate of return	6.95%	6.95%	6.95%	6.95%	7.10%

Schedule of Proportionate Share of the Net OPEB Liability

*For Years Ended June 30, 2018 – 2023**

State Retiree Welfare Benefit Trust

	2023	2022	2021	2020	2019	2018
MOSERS' proportion of the net OPEB liability	0.4000%	0.3760%	0.4313%	0.4352%	0.4375%	0.4121%
MOSERS' proportionate share of the net OPEB liability	$ 5,635,287	$ 6,413,236	$ 7,682,560	$ 7,697,649	$ 7,666,038	$ 7,272,038
MOSERS' covered payroll	$ 7,262,074	$ 7,004,895	$ 7,569,252	$ 7,370,032	$ 7,056,668	$ 6,669,717
MOSERS' proportionate share of the net OPEB liability as a percentage of its covered payroll	77.60%	91.55%	101.50%	104.45%	108.64%	109.03%
Plan fiduciary net position as a percentage of the total OPEB liability	12.12%	10.14%	8.24%	7.31%	6.90%	6.64%

* *The amounts presented in this schedule were determined as of the previous fiscal year end. Intended to show information for 10 years, data for additional years will be displayed as it becomes available.*

Schedule of Employer Contributions for OPEB

*For Years Ended June 30, 2018 – 2023**

	2023	2022	2021	2020	2019	2018
Contractually required contribution	$ 286,406	$ 291,661	$ 283,613	$ 311,510	$ 331,275	$ 301,182
Contributions in relation to the contractually required contribution	$ 286,406	$ 291,661	$ 283,613	$ 311,510	$ 331,275	$ 301,182
Contribution deficiency (excess)	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Covered payroll	$ 7,700,645	$ 7,262,074	$ 7,004,895	$ 7,569,252	$ 7,370,032	$ 7,056,668
Contributions as a percentage of covered payroll	3.72%	4.02%	4.05%	4.12%	4.49%	4.27%

* *Intended to show information for 10 years, data for additional years will be displayed as it becomes available.*

Schedules of Investment Expenses

For the Year Ended June 30, 2023

Investing activity	MSEP	Judicial Plan	Total
Investment management and incentive fees			
Equity			
Artisan International Value Fund	$ 3,134,829	$ 69,229	$ 3,204,058
Baillie Gifford Intl. Alpha Private Equity	1,114,160	24,605	1,138,765
Baillie Gifford EM Private Equity	698,013	15,415	713,428
NS Partners Emerging Markets	1,447,793	31,973	1,479,766
Silchester International Investors	2,009,165	44,370	2,053,535
Multi-asset			
Blackrock	1,246,835	27,535	1,274,370
NISA Investment Advisors	5,014,017	110,729	5,124,746
Alternatives			
ABRDN Eclipse HFRX Macro/CTA SPC	1,630,578	36,009	1,666,587
Aberdeen Davi Alpha	712,435	15,733	728,168
Actis Emerging Markets 3	(349,286)	(7,714)	(357,000)
Actis Emerging Markets 4	(3,804,089)	(84,009)	(3,888,098)
Altas Partners Holdings III LP	8,876	196	9,072
Appian Natural Resources Fund III	415,162	9,168	424,330
Axiom Asia Private Capital Fund II, LP	135,745	2,998	138,743
Axiom Asia Private Capital Fund III, LP	747,362	16,505	763,867
Axiom Asia Fund 6, LP	571,795	12,627	584,422
Axxon Brazil Private Equity Fund II B, LP	153,155	3,382	156,537
Blackstone Real Estate Partners IV	41,985	927	42,912
Blackstone Real Estate Partners V	55,258	1,220	56,478
Blackstone Real Estate Partners VI	(102,515)	(2,264)	(104,779)
Blackstone Real Estate Partners VII	(267,825)	(5,915)	(273,740)
Blackstone Topaz Fund, LP	3,903,810	86,211	3,990,021
Blackstone Topaz Private Credit	2,128,025	46,995	2,175,020
Blue Diamond Non-Directional Fund	2,592,735	57,258	2,649,993
Brevan Howard Alpha Strategies Fund, LP	19,926,261	440,050	20,366,311
Catalyst Fund Limited Partnership III	220,669	4,873	225,542
Catalyst Fund Limited Partnership IV	73,976	1,634	75,610
Catalyst Fund Limited Partnership V	1,864,328	41,172	1,905,500
CBRE U.S. Core Partners, LP	1,552,695	34,290	1,586,985
Centiva Capital	5,727,645	126,489	5,854,134
Cornwall Domestic, LP	27,819	614	28,433
DE Shaw Diopter Fund, LLC	1,054,272	23,282	1,077,554
EIG Energy Fund XIV, LP	101,116	2,233	103,349
EIG Energy Fund XV, LP	94,662	2,090	96,752
EIG Energy Fund XVI, LP	276,929	6,116	283,045
EIG Co-Investment	32,620	720	33,340
Eisler Multi-Strategy Fund, LP	15,854,174	350,123	16,204,297
Elliott International Limited	6,830,249	150,838	6,981,087
Exodus Point Partners Fund	12,914,578	285,205	13,199,783
Farallon Capital Institutional Partners, LP	(8,783)	(194)	(8,977)
Gateway Energy & Resource Holdings, LLC	17,354	383	17,737

Schedule of Investment Expenses continued on following page.

Schedules of Investment Expenses (continued)

For the Year Ended June 30, 2023

Investing activity	MSEP	Judicial Plan	Total
Global Forest Partners GTI7 Institutional Investors Company Ltd.	$ 5,171	$ 114	$ 5,285
Gryphon Partners VI, LP	(464,107)	(10,249)	(474,356)
Harrison Street Real Estate Core Property Fund, LP	1,044,935	23,076	1,068,011
HBK Merger Strategies Offshore Fund, Ltd.	4,011,627	88,592	4,100,219
HIG Middle Mkt LBO Fund IV, LP	1,086,410	23,992	1,110,402
JLL Partners Fund V, LP	(156,372)	(3,453)	(159,825)
JLL Partners Fund VI, LP	(43,382)	(958)	(44,340)
King Street Capital, LP	180,689	3,990	184,679
LaSalle Property Fund	814,005	17,976	831,981
Linden Capital Partners II, LP	(1,101,117)	(24,317)	(1,125,434)
Mercato Partners Traverse IV, LP	3,147,855	69,517	3,217,372
Merit Energy Partners F-II, LP	11,591	256	11,847
MHR Institutional Partners IIA, LP	(719,747)	(15,895)	(735,642)
MHR Institutional Partners III, LP	36,262	801	37,063
MHR Institutional Partners IV, LP	3,102,368	68,512	3,170,880
Millennium USA LP	8,609,917	190,140	8,800,057
Millennium Technology Value Partners II	(1,249,839)	(27,601)	(1,277,440)
Oaktree Real Estate Income Fund, LP	665,654	14,700	680,354
OCM Opportunities Fund VIIb, LP	(10,295)	(227)	(10,522)
OCM Opportunities Fund VIIIb, LP	1,514,504	33,446	1,547,950
OCM Power Opportunities Fund III, LP	(64,582)	(1,426)	(66,008)
Partners Group Direct Equity IV A, LP	2,578,566	56,945	2,635,511
Portfolio Advisors Secondary Fund IV, LP	1,263,513	27,903	1,291,416
Silver Creek Special Opportunities Fund I, LP	24,096	532	24,628
Silver Creek Special Opportunities Fund II, LP	38,724	855	39,579
Standard Investment Research Hedged Equity Fund	5,910,861	130,535	6,041,396
Smart Markets Fund, LP	573,932	12,675	586,607
TA Realty Core Property Fund, LP	807,121	17,824	824,945
Thomas H. Lee Partners LP	2,379,715	52,553	2,432,268
Voleon Institutional Strategies Fund LP	4,256,865	94,008	4,350,873
Voleon Investors Fund LP	1,231,523	27,197	1,258,720
Total investment management and incentive fees	129,285,045	2,855,114	132,140,159
Other investment fees			
Investment consultant fees			
Egan-Jones Ratings Company	8,806	194	9,000
Meketa Investment Group	277,433	6,100	283,533
NEPC	313,115	6,885	320,000
Verus Advisory, Inc.	259,298	5,702	265,000
Total investment consultant fees	858,652	18,881	877,533
Investment custodial and other fees			
BNY Mellon (custodial)	420,658	9,304	429,962
BNY Mellon (performance calculation)	187,927	4,156	192,083
Total investment custodial and other fees	608,585	13,460	622,045
Internal investment activity expenses	6,339,930	57,485	6,397,415
Total investing activity expenses	$ 137,092,212	$ 2,944,940	$ 140,037,152

Schedule of Internal Investment Activity Expenses

For the Year Ended June 30, 2023

Personnel services	
Salaries	$ 2,085,317
Fringe benefits	918,527
Total personnel services	3,003,844
Professional services	
Attorney services	2,680,232
Total professional services	2,680,232
Communications	
Telephone	5,071
Total communications	5,071
Facilities	
Utilities	9,216
Lease expense	84,088
Facility maintenance	10,445
Total facilities	103,749
Software and equipment	
Computer supplies and software	182,489
Total software and equipment	182,489
Education, meetings, and travel	
Professional development including travel	18,584
Due diligence travel	14,894
Total education, meetings, and travel	33,478
General	
Research and information services	375,254
Membership dues	6,975
Office supplies	1,975
Periodicals and publications	4,143
Recruiting	205
Total general	388,552
Total internal investment activity expenses	$ 6,397,415

Schedule of Administrative Expenses

For the Year Ended June 30, 2023

Personnel services	
Salaries	$ 5,600,425
Fringe benefits	2,926,933
Total personnel services	8,527,358
Professional services	
Consulting services	380,078
Attorney services	142,148
Auditing services	80,303
Actuarial services	163,306
Total professional services	765,835
Communications	
Postage and mailing	153,478
Telephone and internet	69,197
Printing	23,355
Video production	1,752
Total communications	247,782
Facilities	
Utilities	79,988
Facility maintenance	65,028
Vehicle maintenance and operation	3,736
Total facilities	148,752
Software and equipment	
Maintenance agreements and licenses	731,720
Computer supplies and software	73,354
Equipment rental	54,143
Gain on sale of equipment	(1,670)
Total software and equipment	857,547
Education, meetings, and travel	
Professional development including travel	92,524
Board travel and meetings	14,826
MOSERS sponsored seminars	74,021
Due diligence	1,119
Total education, meetings, and travel	182,490
General	
Depreciation and amortization	320,676
Insurance	215,709
Business continuity	75,159
Banking services	49,957
Research and information services	48,758
Office supplies and miscellaneous	73,903
Membership dues	26,365
Recruiting and outreach	15,454
Total general	825,981
Total administrative expenses	$ 11,555,745

Schedule of Professional Service Fees

For the Year Ended June 30, 2023

Professional Services		
Operations administrative expenses		
Actuarial services		
Cavanaugh Macdonald Consulting, LLC	$	163,306
Total actuarial services		163,306
Attorney services		
Ice Miller, LLP		72,360
Thompson Coburn, LLP		69,788
Total attorney services		142,148
Auditing services		
Eide Bailly, LLP		80,303
Total auditing services		80,303
Consulting services		
CBIZ Talent and Compensation Solutions – human resources		22,650
Charlesworth & Associates – risk management		13,044
Election-America, Inc. – board election consulting		60,782
Gamble & Schlemeier, Ltd. – governmental affairs		31,173
Linea Solutions – information technology		239,979
Metaformers, Inc. – information technology		6,300
Other consulting services		6,150
Total consulting services		380,078
Total operations administrative expenses		765,835
Investment administrative expenses		
Attorney services		
Bates White, LLC		17,982
Cassels Brock & Blackwell, LLP		87,397
Froese Forensic Partners, Ltd.		10,718
Guru Discovery, LLC		30,079
Quinn Emanuel Urquhart & Sullivan, LLP		2,199,299
Thompson Coburn, LLP		330,792
Other attorney services		3,965
Total attorney services		2,680,232
Total investment administrative expenses		2,680,232
Total professional services expenses	$	3,446,067

Information on investment management and consulting fees can be found in the Schedules of Investment Expenses on pages 60-61.

Capitalized professional service fees for the pension administration system		
Consulting services		
ICON Integration and Design, Inc.	$	309,390
Tegrit		385,000
Total consulting services	$	694,390