



**Cavanaugh Macdonald**  
CONSULTING, LLC  
*The experience and dedication you deserve*

# **GASB STATEMENT NO. 68 REPORT**

**FOR THE**

**MISSOURI STATE EMPLOYEES'**

**RETIREMENT SYSTEM**

**FOR THE**

**MISSOURI STATE EMPLOYEES' PLAN**

**MEASUREMENT DATE: JUNE 30, 2022**





# Cavanaugh Macdonald

CONSULTING, LLC

*The experience and dedication you deserve*

January 3, 2023

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

Dear Board Members:

Presented in this report is information to assist the Missouri State Employees' Retirement System in providing information required under the Governmental Accounting Standards Board (GASB) Statement No. 68 to participating employers. GASB Statement No. 68 establishes accounting and financial reporting requirements for governmental employers who provide pension benefits to their employees through a trust. This report has been prepared as of June 30, 2022, the Measurement Date. The calculations in this report have been made on a basis that is consistent with our understanding of this accounting standard (GASB 68).

The annual actuarial valuation used as a basis for much of the information presented in this report was performed as of June 30, 2022. The valuation was based upon data, furnished by the System's staff, concerning active, inactive and retired members along with pertinent financial information. This information was reviewed for completeness and internal consistency, but was not audited by us. The valuation results depend on the integrity of the data. If any of the information is inaccurate or incomplete, our results may be different and our calculations may need to be revised. Please see the actuarial valuation for additional details on the funding requirements for the Plan, including actuarial assumptions and methods and the funding policy.

To the best of our knowledge, the information contained in this report is complete and accurate. The calculations were performed by qualified actuaries according to generally accepted actuarial principles and practices, as well as in conformity with Actuarial Standards of Practice issued by the Actuarial Standards Board. In order to prepare the results in this report, we have utilized actuarial models that were developed to measure liabilities and develop actuarial costs. These models include tools that we have produced and tested, along with commercially available valuation software that we have reviewed to confirm the appropriateness and accuracy of the output. In utilizing these models, we develop and use input parameters and assumptions about future contingent events along with recognized actuarial approaches to develop the needed results. The calculations are based on the current provisions of the Plan, and on actuarial assumptions that are internally consistent and individually reasonable based on the actual experience of the Plan. In addition, the calculations were completed in compliance with applicable law and, in our opinion, meet the requirements of GASB 68.



Board of Trustees  
January 3, 2023  
Page 2

These results are only for financial reporting and may not be appropriate for funding purposes or other types of analysis. Calculations for purposes other than satisfying the requirements of GASB 68 may produce significantly different results. Future actuarial results may differ significantly from the current results presented in this report due to such factors as changes in plan experience or changes in economic or demographic assumptions.

We, Patrice A. Beckham, FSA, and Bryan K. Hoge, FSA, are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein. We are available to answer any questions on the material contained in this report or to provide explanations or further details as may be appropriate.

Respectfully submitted,

A handwritten signature in blue ink that reads 'Patrice Beckham'.

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

A handwritten signature in blue ink that reads 'Bryan K. Hoge'.

Bryan K. Hoge, FSA, EA, FCA, MAAA  
Consulting Actuary



## TABLE OF CONTENTS

<u>Section</u>	<u>Item</u>	<u>Page No.</u>
I	Summary of Principal Results	1
II	Introduction	2
III	Pension Expense	4
IV	Notes to Financial Statements	6
V	Required Supplementary Information	14

### Appendix

A	Schedule of Changes in Net Pension Liability	18
B	Summary of Plan Provisions	19
C	Statement of Actuarial Assumptions	32
D	Detailed Information for Employers	39
	Exhibit 1 – Schedule of Employer Allocations	
	Exhibit 2 – Schedule of Deferred Resources	
	Exhibit 3 – Schedule of Pension Amounts by Employer	
	Exhibit 4 – Schedule of Recognition Amounts by Employer	



## GASB STATEMENT NO. 68

### MISSOURI STATE EMPLOYEES' RETIREMENT SYSTEM

#### MISSOURI STATE EMPLOYEES' PLAN

#### SECTION I - SUMMARY OF PRINCIPAL RESULTS

<b>Valuation Date (VD):</b>	June 30, 2022
<b>Prior Measurement Date:</b>	June 30, 2021
<b>Measurement Date (MD):</b>	June 30, 2022
<b>Membership Data:</b>	
Retirees and Beneficiaries	53,648
Inactive Vested Members	18,152
Inactive Nonvested Members	28,444
Active Employees	<u>41,595</u>
Total	141,839
<b>Single Equivalent Interest Rate (SEIR):</b>	
Long-Term Expected Rate of Return	6.95%
Municipal Bond Index Rate at Prior Measurement Date	2.13%
Municipal Bond Index Rate at Measurement Date	3.37%
Year in which Fiduciary Net Position is Projected to be Depleted	N/A
Single Equivalent Interest Rate at Prior Measurement Date	6.95%
Single Equivalent Interest Rate at Measurement Date	6.95%
<b>Net Pension Liability:</b>	
Total Pension Liability (TPL)	\$15,408,995,032
Fiduciary Net Position (FNP)	<u>8,248,414,597</u>
Net Pension Liability (NPL = TPL – FNP)	\$7,160,580,435
FNP as a percentage of TPL	53.53%
<b>Collective Pension Expense:</b>	\$846,074,867
<b>Collective Deferred Outflows of Resources:</b>	\$1,579,618,144
<b>Collective Deferred Inflows of Resources:</b>	\$939,368,098



## **SECTION II – INTRODUCTION**

The Governmental Accounting Standards Board issued Statement No. 68 (GASB 68), “*Accounting and Financial Reporting for Pensions*” in June 2012. GASB 68’s effective date for employers was the first fiscal year beginning after June 15, 2014.

This report, prepared as of June 30, 2022 (the Measurement Date), presents information to assist the Missouri State Employees’ Retirement System in providing the required information under GASB 68 to participating employers. Employers can use the information in this report for fiscal years ending on or before June 30, 2023. The Missouri State Employees’ Retirement System for the Missouri State Employees’ Plan (MSEP or Plan) is a cost-sharing multiple employer plan, so the Net Pension Liability and Pension Expense are allocated among the participating employers. Those amounts, which are needed for the employers’ financial statements, are provided in Appendix D.

Much of the material provided in this report, including the Net Pension Liability, is based on the results of the GASB 67 report for the Missouri State Employees’ Retirement System for the MSEP, which was issued January 3, 2023. See the GASB 67 report for more information on the member data, actuarial assumptions and methods used in developing the Net Pension Liability and other GASB 67 results.

GASB 68 requires the inclusion of a proportionate share, as appropriate, of the Collective Net Pension Liability (NPL) on the participating employer’s Statement of Net Position and a determination and proportionate share, as appropriate, of a Collective Pension Expense (PE) in the Notes to the Financial Statements that may bear little relationship to the employer’s funding requirements. In fact, it is possible in some years for the NPL to be an asset or the PE to be an income item. The NPL is set equal to the Total Pension Liability (TPL) minus the Fiduciary Net Position (FNP). The benefit provisions recognized in the calculation of the TPL are summarized in Appendix B.

PE includes amounts for Service Cost (the Normal Cost under Entry Age Normal (EAN) for the year), interest on the TPL, employee contributions, administrative expenses, other cash flows during the year, recognition of increases/decreases in the TPL due to changes in the benefit structure, actual versus expected experience, and actuarial assumption changes, and recognition of investment gains/losses. The actual experience and assumption change impacts are recognized over the average expected remaining service life of the Plan membership as of the beginning of the measurement period, while investment gains/losses are recognized equally over five years. The development of the PE is shown in Section III.

The unrecognized portions of each year’s experience, assumption changes and investment gains/losses are used to develop the Collective Deferred Outflows of Resources and Collective Deferred Inflows of Resources, the proportionate share of which, as appropriate, also must be included on the participating employer’s Statement of Net Position.

Among the items needed for the TPL calculation is a discount rate, as defined by GASB, or a Single Equivalent Interest Rate (SEIR). To determine the SEIR, the FNP must be projected into the future for as long as there are anticipated benefits payable under the plan provisions applicable to the membership and



beneficiaries of the Plan on the Measurement Date. If the FNP is not projected to be depleted at any point in the future, the long-term expected rate of return on plan investments expected to be used to finance the benefit payments may be used as the SEIR.

If, however, the FNP is projected to be depleted at a future measurement date, the SEIR is determined as the single rate that will generate a present value of benefit payments equal to the sum of the present value determined by discounting all projected benefit payments through the date of depletion by the long-term expected rate of return, and the present value determined by discounting those benefits after the date of depletion by a 20-year tax-exempt municipal bond (rating AA/Aa or higher) rate. The rate used, if necessary, for this purpose is the monthly average of the Bond Buyers General Obligation 20-year Municipal Bond Index Rate (formerly published monthly by the Board of Governors of the Federal Reserve System).

Our calculations indicate that the FNP is not projected to be depleted, so the Municipal Bond Index Rate is not used in the determination of the SEIR for either the June 30, 2021 or the June 30, 2022 TPL. The SEIR for both the Measurement Date and the Prior Measurement Date is 6.95%, the long-term assumed rate of return on investments.

The FNP projections are based on the Plan's financial status on the Measurement Date, the indicated set of methods and assumptions, and the requirements of GASB 67 and 68. As such, the FNP projections are not reflective of the cash flows and asset accumulations that would occur on an ongoing plan basis, reflecting the impact of future members. Therefore, the results of this test do not necessarily indicate whether or not the Plan will actually run out of money, the financial condition of the Plan, or the Plan's ability to make benefit payments in future years.

The sections that follow provide the results of all the required calculations, presented in the order set out in GASB 68 for note disclosure and Required Supplementary Information (RSI).



### **SECTION III – PENSION EXPENSE**

As noted earlier, the Collective Pension Expense (PE) consists of a number of different items. GASB 68 refers to the first as Service Cost, which is the Normal Cost using the Entry Age Normal (EAN) actuarial funding method. The second item is interest on the TPL at 6.95%, the SEIR in effect as of the Prior Measurement Date.

The next three items refer to any changes that occurred in the TPL due to:

- benefit changes,
- actual versus expected experience, or
- changes in actuarial assumptions or other inputs.

Benefit changes, which are reflected immediately in PE, will increase PE if there is a benefit improvement for existing Plan members, or decrease PE if there is a benefit reduction. For the plan year ended June 30, 2022, there were no benefit changes to be recognized.

The next item to be recognized is the portion of current year change in the TPL due to actual versus expected Plan experience for the year. The portion to recognize in the current year is determined by spreading the total change over the average expected remaining service life of the entire Plan membership at the beginning of the measurement period. The average expected remaining service life of active members is the average number of years the active members are expected to remain in covered employment. At the beginning of the measurement period this number is 8.530 years. The average expected remaining service life of the inactive members is zero. Therefore, the recognition period is the weighted average of these two amounts, or 2.639 years.

The last item under changes in TPL is changes in actuarial assumptions or other inputs. There were no changes in the actuarial assumptions or other inputs since the Prior Measurement Date. If there was such a change, the change would be recognized over the average expected remaining service life of the entire Plan membership, using the same approach that applied to experience gains and losses, as described earlier.

Employee contributions for the year and projected earnings on the FNP (using the long-term expected rate of return) are subtracted from the amount determined thus far. One-fifth of the current-period difference between projected and actual earnings on the FNP is recognized in the PE.

The current year portions of previously determined experience, assumption changes and earnings amounts, recognized as Collective Deferred Outflows of Resources and Collective Deferred Inflows of Resources are included next. Collective Deferred Outflows of Resources are added to the PE while Collective Deferred Inflows of Resources are subtracted from the PE. Finally, administrative expenses and other miscellaneous items are included.

The calculation of the Collective PE for the year ended June 30, 2022 is shown in the following table.





**Collective Pension Expense  
For the Year Ended**

<b>June 30, 2022</b>	
Service Cost at end of year	\$166,110,518
Interest on the Total Pension Liability	1,017,493,541
Benefit term changes	0
Expensed portion of current-period difference between expected and actual experience in the Total Pension Liability	29,304,760
Expensed portion of current-period assumption changes	0
Employee contributions	(39,809,873)
Projected earnings on plan investments	(646,085,773)
Expensed portion of current-period differences between projected and actual earnings on plan investments	292,498,663
Administrative expenses	9,248,916
Other*	(7,941,083)
Recognition of beginning Deferred Outflows of Resources	347,607,780
Recognition of beginning Deferred Inflows of Resources	(322,352,582)
<b>Total Pension Expense</b>	<b>\$846,074,867</b>

\* Other includes (\$2,321,410) in unallocated employer contributions, of which (\$1,870,844) is from MOSERS.

Note: Plan experience and assumption changes are recognized over the average expected remaining service life for all Plan members, which is 2.639 years.



## SECTION IV – NOTES TO FINANCIAL STATEMENTS

The material presented herein will follow the order presented in GASB 68. Paragraph numbers are provided for ease of reference. Amounts are shown in the aggregate, unless otherwise indicated.

**Paragraph 76(a) – (d):** The required information will be supplied by the Missouri State Employees' Retirement System.

**Paragraph 77:** This paragraph requires information to be disclosed regarding the actuarial assumptions and other inputs used to measure the TPL. The complete set of actuarial assumptions and other inputs utilized in developing the TPL are outlined in Appendix C. The TPL as of June 30, 2022 was determined based on an actuarial valuation prepared as of June 30, 2022, using the following key actuarial assumptions and other inputs:

Price Inflation	2.25 percent
Payroll Growth	2.25 percent
Salary increases, including wage inflation	2.75 to 10.00 percent; General Assembly is assumed to only get wage inflation of 2.50 percent
Long-term Rate of Return, net of investment expense, including price inflation	6.95 percent
Municipal Bond Index Rate	3.37 percent
Year FNP is Projected to be Depleted	N/A
Single Equivalent Interest Rate, net of investment expense, including price inflation	6.95 percent
Cost-of-living adjustment	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	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 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 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.

The actuarial assumptions used in the valuation are based on the results of the most recent actuarial experience study, which covered the five-year period ending June 30, 2020. The experience study report is dated August 4, 2021.

### **Paragraph 78**

**(a): Discount rate (SEIR).** The discount rate used to measure the TPL at June 30, 2022 was 6.95%. There was no change in the SEIR since the Prior Measurement Date.

**(b): Projected cash flows.** The projection of cash flows used to determine the discount rate assumed that plan contributions from members and the employers will be made at the contribution rates as set in state statute:

- a. Employee contribution rate: 4.00% of salary for members hired on or after 1/1/2011; no contributions for members hired before 1/1/2011.
- b. Employer contribution rate: The actuarial required contribution rate is determined as of the Prior Measurement Date (June 30, 2020 for FYE June 30, 2022) and is subject to a minimum employer contribution rate of 16.97% until the plan is at least 80% funded.
- c. Administrative expenses in the prior year were projected forward with price inflation as an estimate for administrative expenses in the current and future years. The portion of expenses in future years allocated to the current members was based on the proportionate share of covered payroll in each year for the remainder of the existing members to the total covered payroll for all members.



Based on those assumptions, the Plan's FNP was projected to be available to make all projected future benefit payments of current Plan members. Therefore, the long-term expected rate of return on Plan investments of 6.95% was applied to all periods of projected benefit payments to determine the TPL.

The FNP projections are based on the Plan's financial status on the Measurement Date, the indicated set of methods and assumptions, and the requirements of GASB 67 and 68. As such, the FNP projections are not reflective of the cash flows and asset accumulations that would occur on an ongoing plan basis, reflecting the impact of future members. Therefore, the results of this test do not necessarily indicate whether or not the Plan will actually run out of money, the financial condition of the Plan, or the Plan's ability to make benefit payments in future years.

**(c): Long-term rate of return.** The long-term expected rate of return on pension plan investments is reviewed regularly as part of the experience study. The most recent experience analysis was performed and results provided in August, 2021. Generally, several factors are considered in evaluating the long-term rate of return assumption including long-term historical data, estimates inherent in current market data, and an analysis in which best-estimate ranges of expected future real rates of return (expected returns, net of investment expense and inflation), along with estimates of variability and correlations for each asset class, were developed by the System's investment consultant. These ranges were combined to develop the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and then adding expected inflation. The capital market assumptions developed by investment consultants are often intended for use over a 10-year investment horizon and are not always useful in setting the long-term rate of return for funding pension plans which covers a longer timeframe.

**(d): Municipal bond rate.** A municipal bond rate was not used in determining the discount rate. If it were required, the rate would be 3.37% on the Measurement Date.

**(e): Period of projected benefit payments.** Projected future benefit payments for all current plan members were projected through 2121.

**(f): Assumed asset allocation.** The target asset allocation and best estimates of real rates of return for each major asset class will be supplied by the System.

**(g): Sensitivity analysis.** This paragraph requires disclosure of the sensitivity of the NPL to changes in the discount rate. The following presents the NPL of the Plan, calculated using the discount rate of 6.95 percent, as well as the Plan's NPL calculated using a discount rate that is 1-percentage-point lower (5.95 percent) or 1-percentage-point higher (7.95 percent) than the current rate:



	1% Decrease (5.95%)	Current Discount Rate (6.95%)	1% Increase (7.95%)
Total Pension Liability	\$17,205,267,110	\$15,408,995,032	\$13,908,348,507
Fiduciary Net Position	<u>8,248,414,597</u>	<u>8,248,414,597</u>	<u>8,248,414,597</u>
Net Pension Liability	\$8,956,852,513	\$7,160,580,435	\$5,659,933,910

**Paragraph 79:** The required information will be supplied by the Missouri State Employees’ Retirement System.

**Paragraph 80:**

**(a)-(b):** This information for each participating employer is provided in Appendix D of this report.

**(c):** The Measurement Date of the Collective NPL is June 30, 2022. The TPL as of June 30, 2022 was determined based on the annual actuarial funding valuation report prepared as of June 30, 2022.

**(d):** There were no changes in the actuarial assumptions or other inputs since the Prior Measurement Date.

**(e):** There were no changes to the benefit provisions since the Prior Measurement Date.

**(f):** The information will be supplied by employers participating in the Missouri State Employees’ Retirement System.

**(g):** Please see Section III for the development of the Collective PE. The proportionate share of Collective PE for each participating employer is provided in Appendix D.

**(h)(1)-(3):** Since certain expense items are recognized over closed periods each year, the deferred portions of these items must be tracked annually. If the amounts will increase PE, then they are labeled Deferred Outflows of Resources. If the amounts serve to reduce PE they are labeled Deferred Inflows of Resources. The recognition of these amounts is accomplished on a level dollar basis, with no interest included in the deferred amounts. Experience gains/losses and the impact of changes in actuarial assumptions or other inputs, if any, are recognized over the average expected remaining service life of the active and inactive Plan members at the beginning of the measurement period. The difference between projected and actual earnings is recognized over a fixed five-year period.



The following tables provide the amounts of the Collective Deferred Outflows of Resources and Collective Deferred Inflows of Resources as of the Measurement Date (June 30, 2022) for the Plan. Per GASB 68, reporting of the differences between projected and actual earnings should be on a net basis, with only one Deferred Outflow or Inflow. This information is provided in the following table. Detail by participating employer is provided in Appendix D of this report.

	Deferred Outflows of Resources	Deferred Inflows of Resources	Net Deferred Outflows/(Inflows) of Resources
Differences between expected and actual experience	\$91,238,568	\$1,916,742	\$89,321,826
Changes of assumptions	169,877,929	0	169,877,929
Differences between projected and actual earnings	1,279,653,000	898,602,709	381,050,291
Changes in proportion	<u>38,848,647</u>	<u>38,848,647</u>	<u>0</u>
Total	\$1,579,618,144	\$939,368,098	\$640,250,046



The following tables show the Collective Deferred Outflows of Resources and Collective Deferred Inflows of Resources separately to provide additional detail. Detail by participating employer is provided in Appendix D of this report.

<b>Deferred Outflows of Resources</b>				
	<b>June 30, 2021</b>	<b>Additions</b>	<b>Recognition</b>	<b>June 30, 2022</b>
<b>Differences between expected and actual experience</b>				
2018 Base	\$ 0	\$ 0	\$ 0	\$ 0
2019 Base	598,595	0	598,595	0
2020 Base	0	0	0	0
2021 Base	88,547,066	0	45,339,000	43,208,066
2022 Base	<u>0</u>	<u>77,335,262</u>	<u>29,304,760</u>	<u>48,030,502</u>
Total	\$ 89,145,661	\$ 77,335,262	\$ 75,242,355	\$ 91,238,568
<b>Changes of assumptions</b>				
2018 Base	\$ 0	\$ 0	\$ 0	\$ 0
2019 Base	5,991,922	0	5,991,922	0
2020 Base	43,854,457	0	40,456,141	3,398,316
2021 Base	341,169,659	0	174,690,046	166,479,613
2022 Base	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	\$ 391,016,038	\$ 0	\$ 221,138,109	\$ 169,877,929
<b>Differences between projected and actual earnings</b>				
2018 Base	\$ 355,854	\$ 0	\$ 355,854	\$ 0
2019 Base	101,388,196	0	50,694,098	50,694,098
2020 Base	88,446,373	0	29,482,124	58,964,249
2021 Base	0	0	0	0
2022 Base	<u>0</u>	<u>1,462,493,316</u>	<u>292,498,663</u>	<u>1,169,994,653</u>
Total	\$ 190,190,423	\$ 1,462,493,316	\$ 373,030,739	\$ 1,279,653,000
<b>Changes in proportion</b>				
2018 Base	\$ 0	\$ 0	\$ 0	\$ 0
2019 Base	1,902,733	0	1,902,733	0
2020 Base	5,554,902	0	5,124,446	430,456
2021 Base	31,984,410	0	16,377,064	15,607,346
2022 Base	<u>0</u>	<u>36,728,384</u>	<u>13,917,539</u>	<u>22,810,845</u>
Total	\$ 39,442,045	\$ 36,728,384	\$ 37,321,782	\$ 38,848,647
<b>Total</b>	<b>\$ 709,794,167</b>	<b>\$ 1,576,556,962</b>	<b>\$ 706,732,985</b>	<b>\$ 1,579,618,144</b>



Deferred Inflows of Resources						
	June 30, 2021	Additions	Recognition	June 30, 2022		
Differences between expected and actual experience						
2018 Base	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
2019 Base	0	0	0	0	0	0
2020 Base	24,735,087	0	22,818,345	1,916,742		
2021 Base	0	0	0	0	0	0
2022 Base	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	\$ 24,735,087	\$ 0	\$ 22,818,345	\$ 1,916,742		
Changes of assumptions						
2018 Base	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
2019 Base	0	0	0	0	0	0
2020 Base	0	0	0	0	0	0
2021 Base	0	0	0	0	0	0
2022 Base	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
Differences between projected and actual earnings						
2018 Base	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
2019 Base	0	0	0	0	0	0
2020 Base	0	0	0	0	0	0
2021 Base	1,198,136,946	0	299,534,237	898,602,709		
2022 Base	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	\$ 1,198,136,946	\$ 0	\$ 299,534,237	\$ 898,602,709		
Changes in proportion						
2018 Base	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
2019 Base	1,902,733	0	1,902,733	0		
2020 Base	5,554,902	0	5,124,446	430,456		
2021 Base	31,984,410	0	16,377,064	15,607,346		
2022 Base	<u>0</u>	<u>36,728,384</u>	<u>13,917,539</u>	<u>22,810,845</u>		
Total	\$ 39,442,045	\$ 36,728,384	\$ 37,321,782	\$ 38,848,647		
Total	\$ 1,262,314,078	\$ 36,728,384	\$ 359,674,364	\$ 939,368,098		

**(h)(4):** Changes in each employer’s proportionate share are shown on Exhibit 2 in Appendix D. The determination of proportionate share is based on individual employer contribution information, provided by the Missouri State Employees’ Retirement System (see Exhibit 1 in Appendix D).

**(h)(5):** Employer contributions subsequent to the Measurement Date are considered Deferred Outflows of Resources. These amounts, if any, will be provided by each participating employer.





**(i):** The following table provides the Collective Deferred Outflows of Resources and Collective Deferred Inflows of Resources as of the Measurement Date (June 30, 2022) for the Plan that will be recognized in PE in future years. **These amounts do not reflect the deferred recognition of changes in proportionate share, recognition of actual contributions that differ from the proportionate share, or employer contributions subsequent to the Measurement Period.**

Appendix D contains the schedule, by participating employer, of the recognition of all amounts except for employer contributions subsequent to the Measurement Date.

Year Ending June 30:	Deferred Outflows of Resources	Deferred Inflows of Resources	Net Deferred Outflows/(Inflows) of Resources
2023	\$615,065,640	\$301,450,979	\$313,614,661
2024	340,706,530	299,534,237	41,172,293
2025	292,498,663	299,534,235	(7,035,572)
2026	292,498,664	0	292,498,664
2027	0	0	0
Thereafter	0	0	0

**(j):** There were no contributions by non-employer contributing entities during the measurement period.



## **SECTION V – REQUIRED SUPPLEMENTARY INFORMATION**

There are several tables of Required Supplementary Information (RSI) that need to be included in the Plan’s financial statements:

**Paragraphs 81(a):** Information under 81(a)(1) (a)-(b), which is determined as of the Measurement Date of the Collective NPL, is provided in Appendix D of this report.

**Paragraphs 81(b):** This information is to be determined as of the employer’s most recent fiscal year-end. Therefore, each participating employer should have the information available to populate the Schedule of Employer Contributions.

**Paragraph 82:** Information about factors that significantly affect trends in the amounts reported in the schedules required by paragraph 81 should be presented as notes to the schedules. At this point, only nine years are being reported, but comments on additional years will be added as they occur.

***Changes of benefit and funding terms:*** The following changes to the plan provisions were made by the Missouri General Assembly and reflected in the valuation performed as of June 30 listed below:

2022: None

2021: None

2020: None

2019: None

2018: Legislation passed in the 2017 session allowed the MOSERS Board of Trustees to establish a voluntary buyout program prior to May 31, 2018 for terminated vested members (those who left state employment with a vested retirement benefit but prior to reaching retirement eligibility). The Board parameters for the buyout provided that eligible terminated vested members could elect to cash out their future monthly retirement benefit in exchange for a one-time lump sum payment equal to 60% of the actuarial present value of their retirement benefit amount.

2017: Senate Bill 62 (SB 62) made the following changes to the MSEP 2011 benefit provisions:

- Active members are now vested after 5 years of service (previously 10 years of service).
- Active members are now eligible for Normal Retirement at age 67 with 5 years of service (previously age 67 with 10 years of service).



- Active members are now eligible for Early Retirement at age 62 with 5 years of service (previously age 62 with 10 years of service).
- Cost-of-living adjustments for vested former members now commence on the second anniversary of the date of retirement (previously commenced on first anniversary).
- Service credit for unused sick leave is only applied for members who terminate service at their early or normal retirement date.
- Survivor benefits for terminated vested members start at the date the member would have been eligible for normal retirement, not at date of death.

2016: None

2015: None

2014: None

***Changes in actuarial assumptions and methods:***

6/30/2022 valuation: None

6/30/2021 valuation:

- Subsequent changes in the UAAL due to actuarial gains/losses or assumption changes are amortized as a level percentage of payroll, over closed 25-year periods.
- The merit component of the salary increase assumption was adjusted to partially reflect observed experience.
- The mortality assumption was changed to reflect the Pub-2010 General Members Below Median Mortality Table. Specifically, the retiree mortality has been changed to be 104% of the Pub-2010 General Members Below Median Table set back two years for males and 104% of the Pub-2010 General Members Below Median Table set forward one year for females. Future generational mortality improvement is reflected by using 100% of Scale MP-2020 through 2020 and 75% of Scale MP-2020 for years after 2020.
- The retirement assumption was changed to have separate tables for MSEP, MSEP 2000 and MSEP 2011. The tables were simplified to reduce the complexity of the select and ultimate retirement assumption by only using rates for first eligibility for unreduced retirement and rates for the years thereafter.
- The termination assumption was changed from select and ultimate tables to a single table based on service only. In addition, the rates are now unisex.
- The disability assumption was adjusted to partially reflect observed experience.
- The percentage of members who are assumed to be married was decreased from 60% to 50% for pre-retirement death benefits and from 70% to 65% upon retirement.



- The military service purchase assumption was reduced from 4 months to 3 months for MSEP and MSEP 2000 members.
- Minor adjustments were made to the loads used to estimate the cost of the immediate unreduced survivor annuity payable to a deferred member's beneficiary upon death.

6/30/2020 valuation:

- The investment return assumption was lowered from 7.10% to 6.95%.
- The price inflation assumption was lowered from 2.35% to 2.25%.
- The payroll growth assumption was lowered from 2.35% to 2.25%.
- The wage growth assumption was lowered from 2.60% to 2.50%.
- The cost-of-living adjustment (COLA) assumption was lowered from 1.88% to 1.80% when no minimum COLA is in effect (80% of price inflation).

6/30/2019 valuation:

- The investment return assumption was lowered from 7.25% to 7.10%.
- The price inflation assumption was lowered from 2.50% to 2.35%.
- The payroll growth assumption was lowered from 2.50% to 2.35%.
- The wage growth assumption was lowered from 2.75% to 2.60%.
- The cost-of-living adjustment (COLA) assumption was lowered from 2.00% to 1.88% when no minimum COLA is in effect (80% of price inflation).

6/30/2018 valuation:

- The investment return assumption was lowered from 7.50% to 7.25%.
- The payroll growth assumption was lowered from 3.00% to 2.50%.
- The wage growth assumption was lowered from 3.00% to 2.75%.
- The asset smoothing method was changed from an open 5-year smoothing method to a closed 5-year smoothing method, with the difference between the actual investment return and the expected investment return on the market value of assets recognized evenly over a closed 5-year period. Due to the change in the asset smoothing method, a transitional plan was necessary. This transitional plan recognizes the unrecognized investment experience as of June 30, 2017 evenly over a closed 7-year period.
- The Unfunded Actuarially Accrued Liability (UAAL) amortization method was changed from one base over a closed 30-year period that began June 30, 2014 to a "layered" approach first effective June 30, 2018. The "Legacy UAAL", as determined in the June 30, 2018 valuation, is amortized over a closed 30-year period. Subsequent changes in the UAAL due to actuarial gains/losses or assumption changes are separately financed by establishing amortization bases and payments, as a level percentage of payroll, over closed 30-year periods. Any change in the Plan's benefit structure shall be amortized over a closed period of 20 years, as set out in state statutes. The total UAAL amortization payment is the sum of the payments for each of the amortization bases.



6/30/2017 valuation:

- The investment return assumption was lowered from 7.65% to 7.50%.

6/30/2016 valuation:

- The long-term rate of return was lowered from 8.00% to 7.65%.
- Salary increases were changed from age based with increases between 3.2% and 5.9% to service based with increase between 3.25% and 8.75%.
- Post-retirement mortality table was updated from the RP-2000 combined healthy mortality table, projected to 2016 with Scale AA to the RP-2014 healthy annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 120%.
- Pre-retirement mortality table was updated from the RP-2000 combined healthy mortality table, projected to 2016 with Scale AA and scaled by 100% for males and 80% for females to the RP-2014 employee mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females.
- The disabled mortality table was updated from the RP-2000 combined healthy mortality table, projected to 2016 with Scale AA and set forward 10 years to the RP-2014 disabled mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females.
- Retirement rates were changed to better reflect actual experience of the Plan.
- The assumption for service credit for unused leave upon retirement and military service purchases was changed from 6 months to 8 months (4 months to 5 months for 2011 plan members).
- Withdrawal rates were changed to better reflect actual experience of the Plan.
- Disability rates were changed to better reflect actual experience of the Plan.
- Pre-retirement survivor benefits for spouse of terminated vested member liability loads were reduced.
- The marriage assumption at retirement was reduced from 75% to 70%.
- The marriage assumption for in-service deaths was reduced from 70% to 60%.
- The asset smoothing period changed from an open 3-year period to an open 5-year period.

6/30/2015 valuation:

- For the 2015 valuation only, the wage inflation was assumed to be 0% in the first year and 3% thereafter.

6/30/2014 valuation:

- The unfunded actuarial accrued liability amortization method was changed from a level percentage of payroll amortized over an open 30-year period to a level percentage of payroll amortized over a closed 30-year period beginning with the 6/30/2014 valuation.



**APPENDIX A**

**ADDITIONAL INFORMATION**

**SCHEDULE OF CHANGES IN THE NET PENSION LIABILITY**

**Measurement Period Ended June 30, 2022**

	<b>Total Pension Liability (a)</b>	<b>Plan Fiduciary Net Position (b)</b>	<b>Net Pension Liability (a) – (b)</b>
<b>Balances at June 30, 2021</b>	\$15,110,646,537	\$9,519,930,080	\$5,590,716,457
<b>Changes for the year:</b>			
Service Cost at end of year	166,110,518		166,110,518
Interest on TPL	1,017,493,541		1,017,493,541
Benefit term changes	0		0
Differences between expected and actual experience	77,335,262		77,335,262
Assumption changes	0		0
Employer contributions*		471,302,256	(471,302,256)
Non-employer contributions		0	0
Employee contributions		39,809,873	(39,809,873)
Net investment income		(816,407,543)	816,407,543
Benefit payments, including member refunds	(962,590,826)	(962,590,826)	0
Administrative expenses		(9,248,916)	9,248,916
Other		5,619,673	(5,619,673)
<b>Net changes</b>	<u>298,348,495</u>	<u>(1,271,515,483)</u>	<u>1,569,863,978</u>
<b>Balances at June 30, 2022</b>	\$15,408,995,032	\$8,248,414,597	\$7,160,580,435

\* (\$468,980,846) was reported and used for the employer allocations in Appendix D. The (\$2,321,410) difference is reflected in Pension Expense under 'Other'.



**APPENDIX B**

**SUMMARY OF PLAN PROVISIONS**

<b>MSEP</b> <b>(Missouri State Employees' Plan)</b>	<b>MSEP 2000</b> <b>(Missouri State Employees' Plan 2000)</b>	<b>MSEP 2011</b> <b>(Missouri State Employees' Plan 2011)</b>
<p><b>DEFINITIONS</b></p> <p><b>Participants</b></p> <p>All MOSERS members, vested former members, retirees and survivors who first became members prior to July 1, 2000 and who do <b>not</b> elect to transfer to the MSEP 2000 plan. Election is made at the time benefits commence.</p>	<ol style="list-style-type: none"> <li>(1) All new employees who first become members on or after July 1, 2000, except full-time teaching and senior administrative personnel of the regional colleges and universities hired on or after July 1, 2002 who will be participants in the Colleges and Universities Retirement Plan (CURP).</li> <li>(2) MSEP active members and vested former members who elect to transfer to the MSEP 2000 plan prior to retirement.</li> <li>(3) MSEP retirees who elect to transfer to the MSEP 2000 plan during the election window from July 1, 2000 through June 30, 2001, and their survivors.</li> <li>(4) MSEP non-vested terminations rehired on or after July 1, 2000.</li> <li>(5) Members hired prior to January 1, 2011 participating in the CURP for six years may elect to change to MOSERS. Transferred service is for vesting purposes only.</li> </ol>	<ol style="list-style-type: none"> <li>(1) All new employees who first become employees on or after January 1, 2011, except full-time teaching and senior administrative personnel of the regional colleges and universities hired on or after July 1, 2002 who will be participants in the Colleges and Universities Retirement Plan (CURP).</li> <li>(2) Members hired on or after January 1, 2011 participating in the CURP for six years may elect to change to MOSERS. Transferred service is for vesting purposes only.</li> </ol>



<b>MSEP</b> <b>(Missouri State Employees' Plan)</b>	<b>MSEP 2000</b> <b>(Missouri State Employees' Plan 2000)</b>	<b>MSEP 2011</b> <b>(Missouri State Employees' Plan 2011)</b>
<p><b>Final average earnings</b></p> <p>The average annual compensation of a member for the three consecutive years of service during which pay was highest (overtime pay is included for purposes of determining Average Compensation). Non-recurring lump sum payments are excluded. Unused sick leave may be converted to additional credited service (usable only for benefit computation, not eligibility).</p> <p><b>Member contributions</b></p> <p>None.</p>	<p>The average annual compensation of a member for the three consecutive years of service during which pay was highest (overtime pay is included for purposes of determining Average Compensation). Non-recurring lump sum payments are excluded. Unused sick leave may be converted to additional credited service (usable only for benefit computation, not eligibility).</p> <p>Same as MSEP.</p>	<p>The average annual compensation of a member for the three consecutive years of service during which pay was highest (overtime pay is included for purposes of determining Average Compensation). Non-recurring lump sum payments are excluded. Unused sick leave may be converted to additional credited service (usable only for benefit computation, not eligibility).</p> <p>4.0% of salary, with interest credited to member contributions based on the 52-week Treasury bill rate (4% prior to June 30, 2014).</p>





<b>MSEP</b> <b>(Missouri State Employees' Plan)</b>	<b>MSEP 2000</b> <b>(Missouri State Employees' Plan 2000)</b>	<b>MSEP 2011</b> <b>(Missouri State Employees' Plan 2011)</b>
<b>ELIGIBILITY FOR BENEFITS</b>		
<b>Normal retirement</b>		
<p><i>Members of the General Assembly:</i> Age 55 with completion of at least 3 full biennial assemblies.</p> <p><i>Statewide Elected Officials:</i> The earliest of attaining: (1) Age 65 with at least 4 years of credited service. (2) Age 60 with at least 15 years of credited service. (3) Age 50 with age plus credited service equal to 80 or more.</p> <p><i>General Employees:</i> The earliest of attaining: (1) Age 65 and active with at least 4 years of credited service. (2) Age 65 with at least 5 years of credited service. (3) Age 60 with at least 15 years of credited service. (4) Age 48 with age plus credited service equal to 80 or more.</p>	<p><i>Members of the General Assembly:</i> The earliest of attaining: (1) Age 55 with completion of at least 3 full biennial assemblies. (2) Age 50 with completion of at least 3 full biennial assemblies and with age plus credited service equal to 80 or more.</p> <p><i>Statewide Elected Officials:</i> The earliest of attaining: (1) Age 55 with at least 4 years of credited service. (2) Age 50 with age plus credited service equal to 80 or more.</p> <p><i>General Employees:</i> The earliest of attaining: (1) Age 62 with at least 5 years of credited service. (2) Age 48 with age plus credited service equal to 80 or more.</p>	<p><i>Members of the General Assembly:</i> The earliest of attaining: (1) Age 62 with completion of at least 3 full biennial assemblies. (2) Age 55 with completion of at least 3 full biennial assemblies and with age plus credited service equal to 90 or more.</p> <p><i>Statewide Elected Officials:</i> The earliest of attaining: (1) Age 62 with at least 4 years of credited service as a statewide elected official. (2) Age 55 with age plus credited service equal to 90 or more.</p> <p><i>General Employees:</i> The earliest of attaining: (1) Age 67 with at least 5 years of credited service. (2) Age 55 with age plus credited service equal to 90 or more.</p>



<b>MSEP</b> <b>(Missouri State Employees' Plan)</b>	<b>MSEP 2000</b> <b>(Missouri State Employees' Plan 2000)</b>	<b>MSEP 2011</b> <b>(Missouri State Employees' Plan 2011)</b>
<p><i>Uniformed Water Patrol Employees:</i>            The earliest of attaining:</p> <ul style="list-style-type: none"> <li>(1) Age 55 and active with at least 4 years of credited service.</li> <li>(2) Age 55 with at least 5 years of credited service.</li> <li>(3) Age 48 with age plus credited service equal to 80 or more.</li> </ul> <p><i>Administrative Law Judges:</i>            The earliest of attaining:</p> <ul style="list-style-type: none"> <li>(1) Age 62 and active with at least 12 years of credited service.</li> <li>(2) Age 60 with at least 15 years of credited service.</li> <li>(3) Age 55 with at least 20 years of credited service.</li> </ul> <p><b>Early retirement for general employees</b></p> <p>Age 55 with at least 10 years of credited service.</p>	<p>Age 57 with at least 5 years of credited service.</p>	<p>Age 62 with at least 5 years of credited service.</p>



<b>MSEP</b> <b>(Missouri State Employees' Plan)</b>	<b>MSEP 2000</b> <b>(Missouri State Employees' Plan 2000)</b>	<b>MSEP 2011</b> <b>(Missouri State Employees' Plan 2011)</b>
<b>MONTHLY BENEFITS PAYABLE</b>		
<b>Normal Retirement</b>		
<p><i>Members of the General Assembly:</i> \$150 per month per biennial assembly served.</p> <p><i>Statewide Elected Officials:</i></p> <p>1) Less than 12 years of credited service: 1.6% of Average Compensation times years of credited service.</p> <p>2) 12 or more years of credited service: 50% of pay of the highest elected position held prior to retirement.</p> <p><i>General Employees:</i> 1.6% of Average Compensation times years of credited service.</p> <p>2.1% of Average Compensation times years of credited service for any period of non-social security covered employment transferred from the Public School Retirement System.</p> <p><i>Uniformed Water Patrol:</i> 2.13% of Average Compensation times years of credited service.</p>	<p><i>Members of the General Assembly:</i> 1/24 of pay times first 24 years of credited service as a member of the General Assembly.</p> <p><i>Statewide Elected Officials:</i> 1/24 of pay (of the highest elected position held prior to retirement) times the first 12 years of credited service as a statewide elected official.</p> <p><i>General Employees:</i> 1.7% of Average Compensation times years of credited service.</p> <p><i>Temporary Benefit:</i> If member retires between ages 48 and 62 with age plus credited service equal to 80 or more, a temporary benefit is payable until the attainment of the minimum age at which reduced social security benefits are payable, in the amount of 0.8% of Average Compensation times years of credited service.</p>	<p><i>Members of the General Assembly:</i> 1/24 of pay times first 24 years of credited service as a member of the General Assembly.</p> <p><i>Statewide Elected Officials:</i> 1/24 of pay (of the highest elected position held prior to retirement) times the first 12 years of credited service as a statewide elected official.</p> <p><i>General Employees:</i> 1.7% of Average Compensation times years of credited service.</p> <p><i>Temporary Benefit:</i> If member retires between ages 55 and 62 with age plus credited service equal to 90 or more, a temporary benefit is payable until the attainment of the minimum age at which reduced social security benefits are payable, in the amount of 0.8% of Average Compensation times years of credited service.</p>



<b>MSEP (Missouri State Employees' Plan)</b>	<b>MSEP 2000 (Missouri State Employees' Plan 2000)</b>	<b>MSEP 2011 (Missouri State Employees' Plan 2011)</b>
<p><i>Administrative Law Judges:</i> 50% of Compensation</p> <p><b>Early retirement for general employees</b></p> <p>Normal retirement amount reduced by ½% for each month that retirement precedes eligibility for normal retirement.</p> <ol style="list-style-type: none"> <li>1) Less than 15 years of service: Normal retirement amount actuarially reduced for years younger than age 65.</li> <li>2) 15 years but less than 20 years of service, and less than the number of years of service necessary for age and service to total 80: Normal retirement amount actuarially reduced for years younger than age 60.</li> <li>3) 20 or more years of service, but less than the number of years of service necessary for age and service to total 80: Normal retirement amount reduced for years younger than the 80 and out eligibility date.</li> </ol>	<p>Non-Social Security Covered Service: 2.5% of Average Compensation times years of credited service for any period of non-social security covered employment transferred from the Public School Retirement System.</p> <p>Normal retirement amount reduced by ½% for each month that retirement precedes eligibility for normal retirement, age 62.</p>	<p>Non-Social Security Covered Service: 2.5% of Average Compensation times years of credited service for any period of non-social security covered employment transferred from the Public School Retirement System.</p> <p>Normal retirement amount reduced by ½% for each month that retirement precedes eligibility for normal retirement, age 67.</p>



MSEP (Missouri State Employees' Plan)				MSEP 2000 (Missouri State Employees' Plan 2000)				MSEP 2011 (Missouri State Employees' Plan 2011)			
<b>Vested deferred benefits</b>											
Benefits for employees who terminate prior to eligibility for an immediate benefit are considered to be vested in accordance with the following schedule (benefits commence at the age the individual would have been eligible for early or normal retirement, considering years of credited service). Unused sick leave is not converted.				Benefits for employees who terminate prior to eligibility for an immediate benefit are considered to be vested in accordance with the following schedule (benefits commence at age 57 for early retirement or 62 for normal retirement). Unused sick leave is not converted. CURP to MOSERS transfers with 6 years of service are immediately vested.				Benefits for employees who terminate prior to eligibility for an immediate benefit are considered to be vested in accordance with the following schedule (benefits commence at age 67 normal retirement). Unused sick leave is not converted.			
Years of Service	General Assembly	Elected Officials	General Employees	Years of Service	General Assembly	Elected Officials	General Employees	Years of Service	General Assembly	Elected Officials	General Employees
4		100%		4		100%		4		100%	
5			100%	5			100%	5			100%
6*	100%			6*	100%			6*	100%		
*3 Assemblies				*3 Assemblies, HB1455 prospectively				*3 Assemblies, HB1455 prospectively			
<b>Death prior to retirement</b>											
The surviving spouse benefit is computed as if the member had been normal retirement age on the date of death and elected the joint and 100% survivor optional form of payment, provided the member had at least 5 years of credited service and was married on the date of death. If no eligible spouse survives, 80% of the member's life income annuity is paid to eligible children until age 21. If the death is duty related, the service requirement is waived and the minimum				The surviving spouse benefit is computed as if the member had been normal retirement age on the date of death and elected the joint and 100% survivor optional form of payment, provided the member had at least 5 years of credited service (3 full assemblies for a member of the General Assembly, 4 years of credited service for a statewide elected official). If no eligible spouse survives, 80% of the member's life income annuity is paid to eligible children until age 21. If the death is duty related, the service requirement is waived				The surviving spouse benefit is computed as if the member had been normal retirement age on the date of death and elected the joint and 100% survivor optional form of payment, provided the member had at least 5 years of credited service (2 full assemblies for a member of the General Assembly, 4 years of credited service for a statewide elected official). If no eligible spouse survives, 80% of the member's life income annuity is paid to eligible children until age 21. If the death is duty related, the service requirement is waived			



MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)
<p>spouse benefit is 50% of Average Compensation (rate of compensation for members of the General Assembly).</p> <p><b>Death after retirement</b></p> <p>50% of the benefit the retired member was receiving on the date of death (the normal form of payment), or the benefit payable under the joint and survivor or period certain form of payment, if the member elected an optional form of payment at time of retirement and provided the member was married on their date of retirement. Effective July 1, 2000, a member who is not married at retirement but marries thereafter may designate a spouse as beneficiary within one year of marriage. Additionally, a member may designate a new spouse as beneficiary within one year of marriage in the event of the death of the spouse the member was married to at the date of retirement (this provision does not apply to period certain annuities).</p>	<p>and the minimum spouse benefit is 50% of Average Compensation (rate of compensation for members of the General Assembly).</p> <p>The benefit payable under the joint and survivor or period certain form of payment, if the member elected an optional form of payment at time of retirement. A member who is not married at retirement but marries thereafter may designate a spouse as beneficiary within one year of marriage. Additionally, a member may designate a new spouse as beneficiary within one year of marriage in the event of the death of the spouse the member was married to at the date of retirement (this provision does not apply to period certain annuities).</p>	<p>and the minimum spouse benefit is 50% of Average Compensation (rate of compensation for members of the General Assembly).</p> <p>The benefit payable under the joint and survivor or period certain form of payment, if the member elected an optional form of payment at time of retirement. A member who is not married at retirement but marries thereafter may designate a spouse as beneficiary upon completion of one year of marriage. Additionally, a member may designate a new spouse as beneficiary upon completion of one year of marriage in the event of the death of the spouse the member was married to at the date of retirement (this provision does not apply to period certain annuities).</p>



<b>MSEP</b> <b>(Missouri State Employees' Plan)</b>	<b>MSEP 2000</b> <b>(Missouri State Employees' Plan 2000)</b>	<b>MSEP 2011</b> <b>(Missouri State Employees' Plan 2011)</b>												
<p><b>Disability</b></p> <p>Normal retirement benefits become payable at the time the member is eligible for normal retirement, and are computed based on: i) the service that would have accrued to the member if active employment had continued; and ii) the member's rate of pay at the time of disability (if the member retires on or after August 28, 1999, the member's rate of pay is based on the rate of pay at the time of disability indexed to the time of benefit commencement). An exception is Uniformed Water Patrol employees who are eligible for an immediate occupational disability benefit equal to 50% of pay at time of disability.</p> <p><b>Post-retirement benefit adjustments</b></p> <p>Benefits are increased to retired members (including survivors) annually in accordance with the following formulas:</p> <table border="1" data-bbox="205 1101 745 1323"> <thead> <tr> <th>Increase in CPI</th> <th>Formula 1 Benefit Increase</th> <th>Formula 2 Benefit Increase</th> </tr> </thead> <tbody> <tr> <td>5.00% or less</td> <td>4%</td> <td>80% of CPI increase</td> </tr> <tr> <td>5.01% - 6.24%</td> <td>80% of CPI increase</td> <td>80% of CPI increase</td> </tr> <tr> <td>6.25% or more</td> <td>5%</td> <td>5%</td> </tr> </tbody> </table>	Increase in CPI	Formula 1 Benefit Increase	Formula 2 Benefit Increase	5.00% or less	4%	80% of CPI increase	5.01% - 6.24%	80% of CPI increase	80% of CPI increase	6.25% or more	5%	5%	<p>Normal retirement benefits become payable at the time the member is eligible for normal retirement, and are computed based on: i) the service that would have accrued to the member if active employment had continued; and ii) the member's rate of pay at the time of disability indexed to the time of benefit commencement. The annual percentage increase in the pay used to compute benefits is the lesser of: i) 80% of the CPI increase and ii) 5%.</p> <p>Benefits are increased to retired members (including survivors) annually in accordance with the following:</p> <p><i>Members of the General Assembly:</i> Benefit is adjusted annually based on the increase in the pay for an active member of the General Assembly.</p>	<p>Normal retirement benefits become payable at the time the member is eligible for normal retirement, and are computed based on: i) the service that would have accrued to the member if active employment had continued; and ii) the member's rate of pay at the time of disability indexed to the time of benefit commencement. The annual percentage increase in the pay used to compute benefits is the lesser of: i) 80% of the CPI increase and ii) 5%.</p> <p>Benefits are increased to retired members (including survivors) annually in accordance with the following:</p> <p><i>Members of the General Assembly:</i> Benefit is adjusted annually based on the increase in the pay for an active member of the General Assembly.</p>
Increase in CPI	Formula 1 Benefit Increase	Formula 2 Benefit Increase												
5.00% or less	4%	80% of CPI increase												
5.01% - 6.24%	80% of CPI increase	80% of CPI increase												
6.25% or more	5%	5%												



<b>MSEP (Missouri State Employees' Plan)</b>	<b>MSEP 2000 (Missouri State Employees' Plan 2000)</b>	<b>MSEP 2011 (Missouri State Employees' Plan 2011)</b>
<p>Members first hired prior to August 28, 1997 receive COLAs based on Formula 1 until an aggregate increase of 65% is reached. At that point subsequent COLAs based on Formula 2 are granted.</p> <p>Members first hired on or after August 28, 1997 receive COLAs based solely on Formula 2.</p> <p>Statewide Elected Officials with 12 or more years of service have their benefit adjusted annually based on the increase in the pay for an active statewide elected official in the member's highest elected position.</p> <p>Members who are fully vested and work beyond age 65 will have their monthly benefit increased upon retirement. The percentage increase in benefit is equal to all COLAs for the years between age 65 and date of retirement, not to exceed 65% and counts toward the Formula 1 65% maximum.</p> <p>Timing of Increase: Benefits are adjusted on the anniversary of the effective date of retirement for most members. Members retiring under the BackDROP provisions have an anniversary based on the retroactive starting date for the BackDROP.</p>	<p><i>Statewide Elected Officials:</i> Benefit is adjusted annually based on the increase in the pay for an active statewide elected official in the retired member's highest elected position.</p> <p><i>General Employees:</i> Annual benefit percentage increase equal to the lesser of: i) 80% of the CPI increase, and 5%.</p> <p>CPI: For the basis of determining CPI, the average monthly reported CPI for the prior calendar year is divided by the average monthly reported CPI for the second prior calendar year to determine the current year increases, if any. If this amount is less than one, benefits are not reduced, nor is there any cumulative effect on future years' determination of CPI.</p> <p>Timing of Increase: Benefits are adjusted on the anniversary of the effective date of retirement for most members. Members retiring under the BackDROP provisions have an anniversary based on the retroactive starting date for the BackDROP.</p>	<p><i>Statewide Elected Officials:</i> Benefit is adjusted annually based on the increase in the pay for an active statewide elected official in the retired member's highest elected position.</p> <p><i>General Employees:</i> Annual benefit percentage increase equal to the lesser of: i) 80% of the CPI increase, and 5%.</p> <p>CPI: For the basis of determining CPI, the average monthly reported CPI for the prior calendar year is divided by the average monthly reported CPI for the second prior calendar year to determine the current year increases, if any. If this amount is less than one, benefits are not reduced, nor is there any cumulative effect on future years' determination of CPI.</p> <p>Timing of Increase: Benefits are adjusted on the anniversary of the effective date of retirement. For inactive vested General Employees who enter retirement, the first COLA will not be granted until the second anniversary of the effective date of retirement.</p>





<b>MSEP (Missouri State Employees' Plan)</b>	<b>MSEP 2000 (Missouri State Employees' Plan 2000)</b>	<b>MSEP 2011 (Missouri State Employees' Plan 2011)</b>
<p><b>Pop-up provision</b></p> <p>Benefits to members who choose a survivor form of payment and whose spouse precedes the member in death, will "pop-up" or revert to the amount the member would have received had he/she not elected a survivor option.</p> <p><b>Portability</b></p> <p>Purchase/Transfer Provisions (in addition to military). Effective August 28, 1999, a member may purchase up to four years of non-federal full-time Missouri public service, provided the member is not vested in another retirement system for that same service.</p>	<p>Same.</p> <p>Purchase/Transfer Provisions (in addition to military). A member may purchase up to four years of non-federal full-time Missouri public service, provided the member is not vested in another retirement system for that same service. Local vested service credit granted after 10 years of state service if the other retirement plan agrees to transfer assets equal to the accrued liability to MOSERS.</p>	<p>Same.</p> <p>May purchase qualifying public sector service at full actuarial cost.</p>



<b>MSEP (Missouri State Employees' Plan)</b>	<b>MSEP 2000 (Missouri State Employees' Plan 2000)</b>	<b>MSEP 2011 (Missouri State Employees' Plan 2011)</b>
<p><b>BackDROP</b></p> <p>To be eligible to participate in the BackDROP, a member must have been eligible to retire under normal retirement age and/or service conditions for at least two years. A retroactive starting date is established for BackDROP purposes which is the later of: 1) the member's normal retirement date or 2) five years prior to the annuity starting date under the retirement plan selected by the member.</p> <p>A member may elect the BackDROP period for the accumulation of the BackDROP account in 12 month increments prior to their actual retirement date or back to the earliest possible date. This results in a BackDROP period of one to five years depending upon the individual situation.</p> <p>A theoretical BackDROP account is accumulated that includes 90% of the value of the benefit payments that would have been paid during the BackDROP period had the member retired at the retroactive starting date with their respective option election. These payments include applicable post-retirement benefit increases.</p>	Same as MSEP.	Not eligible for the BackDROP.



<b>MSEP (Missouri State Employees' Plan)</b>	<b>MSEP 2000 (Missouri State Employees' Plan 2000)</b>	<b>MSEP 2011 (Missouri State Employees' Plan 2011)</b>
<p>The member is paid the resulting lump sum value of the BackDROP account as of the annuity starting date or as three equal annual installments beginning at the annuity starting date.</p> <p>The annuity benefit payable from the actual retirement date is computed with years of service and average pay as of the retroactive starting date for the BackDROP. Post-retirement benefit increases that occurred during the BackDROP period are applied in the calculation of the monthly annuity.</p>		



**APPENDIX C**

**STATEMENT OF ACTUARIAL ASSUMPTIONS**

An experience study which analyzed the System’s economic and demographic assumptions was performed in 2021 and the results were presented to the Board. The assumptions listed below are a result of that experience study. The next experience study is scheduled for 2026.

**Economic Assumptions**

- 1. Investment Return 6.95%, compounded annually, net of investment expenses.
- 2. Inflation 2.25% per year
- 3. Salary Increases Rates vary by service. Sample rates are as follows:

Years	Rates by Service			
	Inflation	Productivity	Merit	Total
0	2.25%	0.25%	7.50%	10.00 %
1	2.25	0.25	2.50	5.00
2	2.25	0.25	2.25	4.75
3	2.25	0.25	2.00	4.50
4	2.25	0.25	1.85	4.35
5	2.25	0.25	1.70	4.20
10	2.25	0.25	1.00	3.50
15	2.25	0.25	0.75	3.25
20	2.25	0.25	0.50	3.00
25+	2.25	0.25	0.25	2.75

General Assembly members have a flat 2.50% assumption

For disabled members, salaries are assumed to be indexed at a rate of 2.50% per year.

- 4. Payroll Growth 2.25% per year  
4.00% on a compounded basis when a minimum COLA of 4.00% is in effect.
- 5. Cost-of-Living Adjustment (COLA) 1.80% on a compounded basis when no minimum COLA is in effect.
- 6. Interest on Member Contributions 1.50% per year
- 7. Administrative Expenses Actual prior year expenses, included in normal cost rate.



## Demographic Assumptions

### 1. Mortality

The mortality assumption includes an appropriate level of conservatism that reflects expected future mortality improvement.

#### a. Post-retirement (Retirees)

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.

#### b. Post-retirement (Beneficiaries)

Pub-2010 General Members Below Median Contingent Survivor mortality table, 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.

#### c. Pre-retirement

Pub-2010 General Members Below Median Employee mortality table, 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.

#### d. Long-term disability

Pub-2010 Non-Safety Disabled Retiree mortality table, without mortality projection.

### 2. Retirement Assumption

#### MSEP

<b>Early Retirement</b>	
<b>Age</b>	<b>Rate</b>
55-56	1%
57-59	2
60-61	8
62	25
63-64	5

<b>Unreduced Retirement</b>	
<b>Age</b>	<b>Rate</b>
48-61	17%
62	21
63-64	17
65-66	30
67-69	25
70	40
71-77	25
78	100



**MSEP 2000**

<b><u>Early Retirement</u></b>	
<b><u>Age</u></b>	<b><u>Rate</u></b>
57-59	3%
60-61	5

<b><u>Unreduced Retirement</u></b>	
<b><u>Age</u></b>	<b><u>Rate</u></b>
48-57	35%
58-60	20
61	12
62	16
63	12
64	20
65	27
66	30
67-69	25
70	30
71-77	25
78	100

**MSEP 2011**

<b><u>Early Retirement</u></b>	
<b><u>Age</u></b>	<b><u>Rate</u></b>
62-64	10%
65	15
66	20

<b><u>Unreduced Retirement</u></b>	
<b><u>Age</u></b>	<b><u>Rate</u></b>
55-57	40%
58-66	15
67-77	20
78	100



### 3. Termination

#### General Employees

<u>Sample Rates</u>	
<u>Service</u>	<u>Rate</u>
1	27.00%
5	12.75
10	7.00
15	4.30
20	2.25
25	1.25

#### Elected Officials and Legislators

<u>Service</u>	<u>Rate</u>
0-3	5.00%
4-7	12.00
8+	35.00

### 4. Disability

<u>Sample Rates</u>	
<u>Age</u>	<u>Rate</u>
25	0.03%
30	0.07
35	0.11
40	0.22
45	0.32
50	0.43
55	0.54
60	0.59
65	0.64



## Other Assumptions

- |                                 |  |
|---------------------------------|--|
| 1. Form of Payment              | MSEP – 50% joint and survivor<br>MSEP 2000 and MSEP 2011 – Straight life annuity   |
| 2. Marital Status               |  |
| a. Percent married              | 65% married at retirement, 50% of those dying in active service are married  |
| b. Spouse’s age                 | Females assumed to be three years younger than males.  |
| 3. Pre-Retirement Death         | 2% of pre-retirement deaths are assumed to be duty related.  |
| 4. Pay Increase Timing          | Beginning of the fiscal year.  |
| 5. Decrement Timing             | Decrements of all types are assumed to occur mid-year.   |
| 6. Eligibility Testing          | Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur. |
| 7. Benefit Service              | Exact fractional service is used to determine the amount of the benefit payable.   |
| 8. Decrement Relativity         | Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.                                    |
| 9. Decrement Operation          | Disability and withdrawal do not operate during normal retirement eligibility.   |
| 10. Other Liability Adjustments | Pre-Retirement Survivor Benefits for Spouse of Terminated Vested Member  |

Age	Male/Female
<30	1.56/1.42
30-39	1.26/1.20
40-49	1.11/1.08
>50	1.02/1.02

These factors are used to estimate the cost of immediate unreduced survivor annuities upon the death of a vested member under the MSEP and MSEP 2000 plans.





11. Incidence of Contributions Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report, and the actual payroll payable at the time contributions are made. New entrant normal cost contributions are applied to the funding of new entrant benefits.
12. MSEP 2000 Election All regular state employees hired on or before June 30, 2000 are assumed to elect MSEP 2000 prior to age 62 if eligible for the benefit and MSEP on or after age 62. Elected Officials, General Assembly, and Uniformed Water Patrol Members hired before July 1, 2000 are assumed to elect MSEP at retirement.
13. Service Adjustment It is assumed that each member will be granted months of service credit for unused leave and military service purchases at retirement in the following amounts:
- MSEP / MSEP 2000
- 7 months (4 months of unused leave; 3 months of military service purchases)
- MSEP 2011
- 5 months (5 months of unused leave; not eligible for military service purchases)
14. Forfeitures For MSEP 2011 members only: Value the greater of the refund amount or the present value of the deferred benefit.
15. Salary and Benefit Limits For purposes of the valuation, no limits were applied to member compensation or benefits.
16. Commencement Age for Deferred Vested Benefit Normal Retirement Date



## **Data Adjustments**

Active and retired member data was reported as of May 31, 2022. It was brought forward to June 30, 2022 by adding one month of service for all active members, one month of contributions and interest for MSEP 2011 members, and the June COLA for certain retired members. Financial information continues to be reported as of June 30. This procedure was instituted to provide sufficient time for the Board of Trustees to certify the appropriate contribution rate prior to the October 1 statutory deadline.

Active members reported with less than a \$100 annualized salary were assumed to receive the average active member pay. As a result, there are 28 active members in the June 30, 2022 data whose salary is assumed to be \$47,500.

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

For any retired member who has elected a joint and survivor benefit yet has no beneficiary date of birth provided, it was assumed that the beneficiary is 3 years younger for male retirees and 3 years older for female retirees.

## **TECHNICAL VALUATION PROCEDURES**

### **Other Valuation Procedures**

Salary increases are assumed to apply to annual amounts.

Decrement are assumed to occur mid-year, except that immediate retirement is assumed for those who are at or above the age at which retirement rates are 100%.

No actuarial liability is included for participants who terminated without being vested prior to the valuation date, except those due a refund of contributions.



## **APPENDIX D**

# **DETAILED INFORMATION FOR PARTICIPATING EMPLOYERS**



# Exhibit 1

## Missouri State Employees' Retirement System Schedule of Employer Allocations For the Years Ended 6/30/2021 and 6/30/2022

Entity	Year Ended June 30, 2021		Year Ended June 30, 2022	
	Employer Contributions	Employer Allocated Proportion	Employer Contributions	Employer Allocated Proportion
Total	\$461,175,748		\$468,980,846	
State of Missouri	387,441,514	84.011685%	391,499,395	83.478757%
Environmental Improvement and Energy Resource Authority	56,423	0.012235%	53,417	0.011390%
Missouri Agriculture and Small Business Development Authority	27,310	0.005922%	23,935	0.005104%
Missouri Consolidated Health Care Plan	656,169	0.142282%	686,947	0.146477%
Missouri Development Finance Board	125,139	0.027135%	111,636	0.023804%
Missouri Housing Development Commission	1,332,508	0.288937%	1,684,005	0.359078%
Missouri Public Entity Risk Management	145,867	0.031629%	177,166	0.037777%
Missouri Technology Corporation	10,815	0.002345%	12,576	0.002682%
Missouri Wine and Grape Board	62,144	0.013475%	67,791	0.014455%
Harris Stowe State University	2,414,222	0.523493%	2,372,204	0.505821%
Lincoln University	3,352,645	0.726978%	3,470,564	0.740023%
Missouri Southern State University	4,028,953	0.873626%	4,132,983	0.881269%
Missouri State University	21,790,636	4.725018%	23,157,451	4.937824%
Missouri Western State University	3,840,677	0.832801%	3,785,834	0.807247%
Northwest Missouri State University	7,290,142	1.580773%	7,846,390	1.673073%
Southeast Missouri State University	9,261,441	2.008224%	9,489,137	2.023353%
State Technical College of Missouri	2,333,823	0.506059%	2,705,199	0.576825%
Truman State University	6,398,954	1.387530%	6,428,840	1.370811%
University of Central Missouri	10,606,366	2.299853%	11,275,376	2.404230%



Exhibit 2

Missouri State Employees' Retirement System  
 Schedule of Deferred Resources  
 Measurement Date: 6/30/2022

Entity	Deferred Outflows of Resources							Deferred Inflows of Resources				
	6/30/21 Net Pension Liability (NPL)	6/30/22 Net Pension Liability (NPL)	Differences Between Expected and Actual Experience	Net Difference Between Projected and Actual Earnings on Pension Plan Investments	Changes of Assumptions	Changes in Proportion	Total Deferred Outflows of Resources	Differences Between Expected and Actual Experience	Net Difference Between Projected and Actual Earnings on Pension Plan Investments	Changes of Assumptions	Changes in Proportion	Total Deferred Inflows of Resources
Total	\$5,590,716,457	\$7,160,580,435	\$91,238,568	\$1,279,653,000	\$169,877,929	\$38,848,647	\$1,579,618,144	\$1,916,742	\$898,602,709	\$0	\$38,848,647	\$939,368,098
State of Missouri	4,696,855,099	5,977,563,541	76,164,822	1,068,238,420	141,811,984	13,902,425	1,300,117,651	1,600,074	750,142,372	0	20,333,181	772,075,627
Environmental Improvement and Energy Resource Authority	684,024	815,590	10,392	145,752	19,349	21,859	197,352	218	102,351	0	32,240	134,809
Missouri Agriculture and Small Business Development Authority	331,082	365,476	4,657	65,313	8,671	419	79,060	98	45,865	0	104,132	150,095
Missouri Consolidated Health Care Plan	7,954,583	10,488,603	133,644	1,874,397	248,832	160,055	2,416,928	2,808	1,316,246	0	21,991	1,341,045
Missouri Development Finance Board	1,517,041	1,704,505	21,718	304,609	40,438	6,607	373,372	456	213,903	0	127,090	341,449
Missouri Housing Development Commission	16,153,648	25,712,069	327,618	4,594,952	609,994	2,856,595	8,389,159	6,883	3,226,685	0	10,717	3,244,285
Missouri Public Entity Risk Management	1,768,288	2,705,052	34,467	483,415	64,175	236,162	818,219	724	339,465	0	36,499	376,688
Missouri Technology Corporation	131,102	192,047	2,447	34,320	4,556	12,858	54,181	51	24,101	0	42,758	66,910
Missouri Wine and Grape Board	753,349	1,035,062	13,189	184,974	24,556	37,391	260,110	277	129,893	0	5,195	135,365
Harris Stowe State University	29,267,009	36,219,720	461,504	6,472,754	859,278	1,058,831	8,852,367	9,695	4,545,321	0	674,252	5,229,268
Lincoln University	40,643,279	52,989,942	675,186	9,469,727	1,257,136	497,715	11,899,764	14,184	6,649,867	0	338,307	7,002,358
Missouri Southern State University	48,841,953	63,103,976	804,057	11,277,185	1,497,082	291,608	13,869,932	16,892	7,919,107	0	2,230,531	10,166,530
Missouri State University	264,162,359	353,576,859	4,505,200	63,187,013	8,388,273	8,119,339	84,199,825	94,645	44,371,420	0	3,994,239	48,460,304
Missouri Western State University	46,559,543	57,803,571	736,521	10,329,960	1,371,334	0	12,437,815	15,473	7,253,943	0	3,378,623	10,648,039
Northwest Missouri State University	88,376,536	119,801,738	1,526,488	21,409,529	2,842,182	3,589,846	29,368,045	32,068	15,034,279	0	27,255	15,093,602
Southeast Missouri State University	112,274,110	144,883,819	1,846,078	25,891,897	3,437,230	577,227	31,752,432	38,782	18,181,905	0	1,459,189	19,679,876
State Technical College of Missouri	28,292,324	41,304,018	526,287	7,381,358	979,898	3,423,905	12,311,448	11,056	5,183,365	0	3,755	5,198,176
Truman State University	77,572,868	98,158,024	1,250,708	17,541,624	2,328,705	0	21,121,037	26,275	12,318,145	0	2,921,907	15,266,327
University of Central Missouri	128,578,260	172,156,823	2,193,585	30,765,801	4,084,256	4,055,805	41,099,447	46,083	21,604,476	0	3,106,786	24,757,345

In addition, it is the employer's responsibility to adjust these numbers for any employer contributions subsequent to the Measurement Date, which are to be reported as a Deferred Outflow of Resources. Please consult GASB 68, Paragraph 89.



### Exhibit 3

## Missouri State Employees' Retirement System Schedule of Pension Amounts by Employer Measurement Date: 6/30/2022

Entity	Pension Expense		
	Proportionate Share of Plan Pension Expense	Net Recognition of Deferred Amounts from Changes in Proportionate Share	Total Employer Pension Expense
Total	\$846,074,867	\$0	\$846,074,867
State of Missouri	706,292,781	6,489,130	712,781,911
Environmental Improvement and Energy Resource Authority	96,368	34,032	130,400
Missouri Agriculture and Small Business Development Authority	43,184	(87,532)	(44,348)
Missouri Consolidated Health Care Plan	1,239,305	(9,276)	1,230,029
Missouri Development Finance Board	201,400	(59,795)	141,605
Missouri Housing Development Commission	3,038,069	1,648,276	4,686,345
Missouri Public Entity Risk Management	319,622	132,644	452,266
Missouri Technology Corporation	22,692	(98,762)	(76,070)
Missouri Wine and Grape Board	122,300	15,168	137,468
Harris Stowe State University	4,279,624	1,109,659	5,389,283
Lincoln University	6,261,149	(94,625)	6,166,524
Missouri Southern State University	7,456,196	(2,298,063)	5,158,133
Missouri State University	41,777,688	206,742	41,984,430
Missouri Western State University	6,829,914	(4,854,734)	1,975,180
Northwest Missouri State University	14,155,450	3,015,685	17,171,135
Southeast Missouri State University	17,119,081	(2,514,269)	14,604,812
State Technical College of Missouri	4,880,371	2,435,873	7,316,244
Truman State University	11,598,087	(4,178,479)	7,419,608
University of Central Missouri	20,341,586	(891,674)	19,449,912



## Exhibit 4

### Missouri State Employees' Retirement System Schedule of Recognition Amounts by Employer Measurement Date: 6/30/2022

Entity	NPL Sensitivities			Schedule of Recognition of Deferred Outflows/(Inflows) of Resources for Fiscal Year					
	Current			2023	2024	2025	2026	2027	Thereafter
	1% Decrease (5.95%)	Discount Rate (6.95%)	1% Increase (7.95%)						
Total	\$8,956,852,513	\$7,160,580,435	\$5,659,933,910	\$313,614,661	\$41,172,293	(\$7,035,572)	\$292,498,664	\$0	\$0
State of Missouri	7,477,069,142	5,977,563,541	4,724,842,476	263,298,199	26,442,782	(5,873,208)	244,174,250	0	0
Environmental Improvement and Energy Resource Authority	1,020,186	815,590	644,666	37,910	(7,881)	(801)	33,316	0	0
Missouri Agriculture and Small Business Development Authority	457,158	365,476	288,883	(75,538)	(10,066)	(359)	14,929	0	0
Missouri Consolidated Health Care Plan	13,119,729	10,488,603	8,290,501	535,037	122,709	(10,306)	428,443	0	0
Missouri Development Finance Board	2,132,089	1,704,505	1,347,291	3,719	(39,748)	(1,675)	69,626	0	0
Missouri Housing Development Commission	32,162,087	25,712,069	20,323,577	2,928,647	1,191,192	(25,264)	1,050,298	0	0
Missouri Public Entity Risk Management	3,383,630	2,705,052	2,138,153	226,685	107,006	(2,658)	110,497	0	0
Missouri Technology Corporation	240,223	192,047	151,799	(26,502)	6,117	(189)	7,845	0	0
Missouri Wine and Grape Board	1,294,713	1,035,062	818,143	62,951	20,529	(1,017)	42,281	0	0
Harris Stowe State University	45,305,641	36,219,720	28,629,134	2,233,780	(54,614)	(35,587)	1,479,520	0	0
Lincoln University	66,282,769	52,989,942	41,884,813	2,286,183	498,730	(52,065)	2,164,557	0	0
Missouri Southern State University	78,933,965	63,103,976	49,879,243	711,177	476,528	(62,002)	2,577,700	0	0
Missouri State University	442,273,613	353,576,859	279,477,575	16,445,338	5,198,518	(347,404)	14,443,069	0	0
Missouri Western State University	72,303,923	57,803,571	45,689,647	(466,861)	(47,755)	(56,794)	2,361,187	0	0
Northwest Missouri State University	149,854,681	119,801,738	94,694,826	7,436,625	2,061,811	(117,710)	4,893,716	0	0
Southeast Missouri State University	181,228,744	144,883,819	114,520,443	5,238,526	1,058,105	(142,355)	5,918,280	0	0
State Technical College of Missouri	51,665,365	41,304,018	32,647,914	4,176,509	1,290,140	(40,583)	1,687,205	0	0
Truman State University	122,781,520	98,158,024	77,586,997	1,625,853	315,699	(96,444)	4,009,604	0	0
University of Central Missouri	215,343,335	172,156,823	136,077,829	6,936,423	2,542,491	(169,151)	7,032,341	0	0

Deferred Outflows for contributions made after 6/30/22 are not reflected. Please consult GASB 68, Paragraph 89.

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**Cavanaugh Macdonald**  
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# **GASB STATEMENT NO. 68 REPORT**

**FOR THE**

**MISSOURI STATE EMPLOYEES'**

**RETIREMENT SYSTEM**

**FOR THE**

**JUDICIAL RETIREMENT PLAN**

**MEASUREMENT DATE: JUNE 30, 2022**





# Cavanaugh Macdonald

CONSULTING, LLC

*The experience and dedication you deserve*

January 3, 2023

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

Dear Board Members:

Presented in this report is information to assist the Missouri State Employees' Retirement System in providing information required under the Governmental Accounting Standards Board (GASB) Statement No. 68 to the State of Missouri. GASB Statement No. 68 establishes accounting and financial reporting requirements for governmental employers who provide pension benefits to their employees through a trust. This report has been prepared as of June 30, 2022. The calculations in this report have been made on a basis that is consistent with our understanding of this accounting standard (GASB 68).

The annual actuarial valuation used as a basis for much of the information presented in this report was performed as of June 30, 2022. The valuation was based upon data, furnished by the System's staff, concerning active, inactive and retired members along with pertinent financial information. This information was reviewed for completeness and internal consistency, but was not audited by us. The valuation results depend on the integrity of the data. If any of the information is inaccurate or incomplete, our results may be different and our calculations may need to be revised. Please see the actuarial valuation for additional details on the funding requirements for the Plan, including actuarial assumptions and methods and the funding policy.

To the best of our knowledge, the information contained in this report is complete and accurate. The calculations were performed by qualified actuaries according to generally accepted actuarial principles and practices, as well as in conformity with Actuarial Standards of Practice issued by the Actuarial Standards Board. In order to prepare the results in this report, we have utilized actuarial models that were developed to measure liabilities and develop actuarial costs. These models include tools that we have produced and tested, along with commercially available valuation software that we have reviewed to confirm the appropriateness and accuracy of the output. In utilizing these models, we develop and use input parameters and assumptions about future contingent events along with recognized actuarial approaches to develop the needed results. The calculations are based on the current provisions of the Plan, and on actuarial assumptions that are internally consistent and individually reasonable based on the actual experience of the Plan. In addition, the calculations were completed in compliance with applicable law and, in our opinion, meet the requirements of GASB 68.

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Board of Trustees  
January 3, 2023  
Page 2

These results are only for financial reporting and may not be appropriate for funding purposes or other types of analysis. Calculations for purposes other than satisfying the requirements of GASB 68 may produce significantly different results. Future actuarial results may differ significantly from the current results presented in this report due to such factors as changes in plan experience or changes in economic or demographic assumptions.

We, Patrice A. Beckham, FSA, and Bryan K. Hoge, FSA, are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein. We are available to answer any questions on the material contained in this report or to provide explanations or further details as may be appropriate.

Respectfully submitted,

A handwritten signature in blue ink that reads 'Patrice Beckham' in a cursive script.

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

A handwritten signature in blue ink that reads 'Bryan K. Hoge' in a cursive script.

Bryan K. Hoge, FSA, EA, FCA, MAAA  
Consulting Actuary



## TABLE OF CONTENTS

<u>Section</u>	<u>Item</u>	<u>Page No.</u>
I	Summary of Principal Results	1
II	Introduction	2
III	Pension Expense	4
IV	Notes to Financial Statements	6
V	Required Supplementary Information	16
 <u>Appendix</u>		
A	Schedule of Changes in Net Pension Liability	20
B	Summary of Plan Provisions	24
C	Statement of Actuarial Assumptions	27



## GASB STATEMENT NO. 68

### MISSOURI STATE EMPLOYEES' RETIREMENT SYSTEM

#### JUDICIAL RETIREMENT PLAN

#### SECTION I - SUMMARY OF PRINCIPAL RESULTS

<b>Valuation Date (VD):</b>	June 30, 2022
<b>Prior Measurement Date:</b>	June 30, 2021
<b>Measurement Date (MD):</b>	June 30, 2022
<b>Membership Data:</b>	
Retirees and Beneficiaries	596
Inactive Vested Members	27
Inactive Nonvested Members	0
Active Employees	<u>415</u>
Total	1,038
<b>Single Equivalent Interest Rate (SEIR):</b>	
Long-Term Expected Rate of Return	6.95%
Municipal Bond Index Rate at Prior Measurement Date	2.13%
Municipal Bond Index Rate at Measurement Date	3.37%
Year in which Fiduciary Net Position is Projected to be Depleted	N/A
Single Equivalent Interest Rate at Prior Measurement Date	6.95%
Single Equivalent Interest Rate at Measurement Date	6.95%
<b>Net Pension Liability:</b>	
Total Pension Liability (TPL)	\$630,043,013
Fiduciary Net Position (FNP)	<u>190,449,086</u>
Net Pension Liability (NPL = TPL – FNP)	\$439,593,927
FNP as a percentage of TPL	30.23%
<b>Collective Pension Expense:</b>	\$35,468,688
<b>Collective Deferred Outflows of Resources:</b>	\$30,728,964
<b>Collective Deferred Inflows of Resources:</b>	\$36,725,769



## **SECTION II – INTRODUCTION**

The Governmental Accounting Standards Board issued Statement No. 68 (GASB 68), “*Accounting and Financial Reporting for Pensions*” in June 2012. GASB 68’s effective date for employers was the first fiscal year beginning after June 15, 2014. The Missouri State Employees’ Retirement System for the Judicial Retirement Plan (Judges or Plan) is a single-employer defined benefit pension plan.

This report, prepared as of June 30, 2022 (the Measurement Date), presents information to assist Missouri State Employees’ Retirement System for the Judicial Retirement Plan in providing the required information under GASB 68 to the State of Missouri. Much of the material provided in this report, including the Net Pension Liability, is based on the results of the GASB 67 report for the Missouri State Employees’ Retirement System for the Judicial Retirement Plan, which was issued January 3, 2023. See the GASB 67 report for more information on the member data, actuarial assumptions, and methods used in developing the GASB 67 results.

GASB 68 requires the inclusion of a Net Pension Liability (NPL) on the employer’s Statement of Net Position and a determination of a Pension Expense (PE) in the Notes to the Financial Statements, that may bear little relationship to the employer’s funding requirements. In fact, it is possible in some years for the NPL to be an asset or the PE to be an income item. The NPL is set equal to the Total Pension Liability (TPL) minus the Fiduciary Net Position (FNP). The benefit provisions recognized in the calculation of the TPL are summarized in Appendix B.

PE includes amounts for Service Cost (the Normal Cost under Entry Age Normal (EAN) for the year), interest on the TPL, employee contributions, administrative expenses, other cash flows during the year, recognition of increases/decreases in the TPL due to changes in the benefit structure, actual versus expected experience, actuarial assumption changes, and recognition of investment gains/losses. The actual experience and assumption change impacts are recognized over the average expected remaining service life of the Plan membership as of the beginning of the measurement period, while investment gains/losses are recognized equally over five years. The development of the PE is shown in Section III.

The unrecognized portions of each year’s experience, assumption changes and investment gains/losses are used to develop the Deferred Outflows of Resources and Deferred Inflows of Resources, which also must be included on the employer’s Statement of Net Position.

Among the items needed for the TPL calculation is a discount rate, as defined by GASB, or a Single Equivalent Interest Rate (SEIR). To determine the SEIR, the FNP must be projected into the future for as long as there are anticipated benefits payable under the plan provisions applicable to the membership and beneficiaries of the Plan on the Measurement Date. If the FNP is not projected to be depleted at any point in the future, the long-term expected rate of return on plan investments expected to be used to finance the benefit payments may be used as the SEIR.

If, however, the FNP is projected to be depleted at a future measurement date, the SEIR is determined as the single rate that will generate a present value of benefit payments equal to the sum of the present value



determined by discounting all projected benefit payments through the date of depletion by the long-term expected rate of return, and the present value determined by discounting those benefits after the date of depletion by a 20-year tax-exempt municipal bond (rating AA/Aa or higher) rate. The rate used, if necessary, for this purpose is the monthly average of the Bond Buyers General Obligation 20-year Municipal Bond Index Rate (formerly published monthly by the Board of Governors of the Federal Reserve System).

Our calculations indicate that the FNP is not projected to be depleted, so the Municipal Bond Index Rate is not used in the determination of the SEIR for either the June 30, 2021 or the June 30, 2022 TPL. The SEIR for both the Measurement Date and the Prior Measurement Date is 6.95%, the long-term assumed rate of return on investments.

The FNP projections are based on the Plan's financial status on the Measurement Date, the indicated set of methods and assumptions, and the requirements of GASB 67 and 68. As such, the FNP projections are not reflective of the cash flows and asset accumulations that would occur on an ongoing plan basis, reflecting the impact of future members. Therefore, the results of this test do not necessarily indicate whether or not the fund will actually run out of money, the financial condition of the Plan, or the Plan's ability to make benefit payments in future years.

The sections that follow provide the results of all the required calculations, presented in the order laid out in GASB 68 for note disclosure and Required Supplementary Information (RSI).



### **SECTION III – PENSION EXPENSE**

As noted earlier, the Pension Expense (PE) consists of a number of different items. GASB 68 refers to the first item as Service Cost, which is the Normal Cost using the Entry Age Normal (EAN) actuarial funding method. The second item is interest on the TPL at 6.95%, the SEIR in effect as of the Prior Measurement Date.

The next three items refer to any changes that occurred in the TPL due to:

- benefit changes,
- actual versus expected experience, or
- changes in actuarial assumptions or other inputs.

Benefit changes, which are reflected immediately in PE, will increase PE if there is a benefit improvement for existing Plan members, or decrease PE if there is a benefit reduction. For the plan year ended June 30, 2022, there were no benefit changes to be recognized.

The next item to be recognized is the portion of current year change in TPL due to actual versus expected Plan experience for the year. The portion to recognize in the current year is determined by spreading the total change over the average expected remaining service life of the entire Plan membership at the beginning of the measurement period. The average expected remaining service life of active members is the average number of years the active members are expected to remain in covered employment. At the beginning of the measurement period, this number is 10.821 years. The average expected remaining service life of the inactive members is zero. Therefore, the recognition period is the weighted average of these two amounts, or 4.300 years.

The last item under changes in TPL is changes in actuarial assumptions or other inputs. There were no changes in the actuarial assumptions or other inputs since the Prior Measurement Date. If there was such a change, the change would be recognized over the average expected remaining service life of the entire Plan membership, using the same approach that applied to experience gains and losses, as described earlier.

Employee contributions for the year and projected earnings on the FNP (using long-term expected rate of return) are subtracted from the amount determined thus far. One-fifth of the current-period difference between projected and actual earnings on the FNP is recognized in the PE.

The current year portions of previously determined experience, assumption changes and earnings amounts, recognized as Deferred Outflows of Resources and Deferred Inflows of Resources are included next. Deferred Outflows of Resources are added to the PE while Deferred Inflows of Resources are subtracted from the PE. Finally, administrative expenses and other miscellaneous items are included.

The calculation of the PE for the year ended June 30, 2022 is shown in the following table.





**Pension Expense  
For the Year Ended**

<b>June 30, 2022</b>	
Service Cost at end of year	\$13,303,763
Interest on the Total Pension Liability	42,073,646
Benefit term changes	0
Expensed portion of current-period difference between expected and actual experience in the Total Pension Liability	(2,113,543)
Expensed portion of current-period assumption changes	0
Employee contributions	(1,550,712)
Projected earnings on plan investments	(14,607,618)
Expensed portion of current-period differences between projected and actual earnings on plan investments	6,681,913
Administrative expenses	79,492
Other	0
Recognition of beginning Deferred Outflows of Resources	4,581,934
Recognition of beginning Deferred Inflows of Resources	<u>(12,980,187)</u>
<b>Total Pension Expense</b>	<b>\$35,468,688</b>

Note: Plan experience and assumption changes are recognized over the average expected remaining service life for all Plan members, which is 4.300 years.



**SECTION IV – NOTES TO FINANCIAL STATEMENTS**

The material presented herein will follow the order presented in GASB 68. Paragraph numbers are provided for ease of reference.

**Paragraph 37:** The information required is to be prepared by the System and employer.

**Paragraph 38:** The information required is to be prepared by the System and employer.

**Paragraph 39:** Not Applicable.

**Paragraph 40(a) – (b):** The information required is to be supplied by the System.

**Paragraph 40(c):** The data required regarding the membership of the Plan were furnished by the System. The following table summarizes the membership of the Plan as of June 30, 2022, the date of the valuation used to determine the June 30, 2022 TPL.

**Membership**

<b>Number as of June 30, 2022</b>	
Inactive Members Or Their Beneficiaries	596
Currently Receiving Benefits	
Inactive Members Entitled To But Not Yet	27
Receiving Benefits	
Inactive Nonvested Members	0
Active Members	415
<b>Total</b>	<b>1,038</b>

**Paragraph 40(d) – (e):** The information required is to be supplied by the System.

**Paragraph 41:** This paragraph requires information to be disclosed regarding the actuarial assumptions and other inputs used to measure the TPL. The complete set of actuarial assumptions and other inputs utilized in developing the TPL are outlined in Appendix C. The TPL as of June 30, 2022 was determined based on an actuarial valuation prepared as of June 30, 2022, using the following key actuarial assumptions and other inputs:



Price Inflation	2.25 percent
Payroll Growth	2.25 percent
Salary increases, including wage inflation	3.00 percent
Long-term Rate of Return, net of investment expense, including price inflation	6.95 percent
Municipal Bond Index Rate	3.37 percent
Year FNP is projected to be depleted	N/A
Single Equivalent Interest Rate, net of investment expense, including price inflation	6.95 percent
Cost-of-living adjustment	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	<p>Pre-retirement mortality rates were based on the Pub-2010 General Members Median Employee mortality table. Mortality projected generationally from 2010 to 2020 using Scale MP-2020 and 75% of Scale MP-2020 for years after 2020.</p> <p>Post-retirement mortality rates for retirees were based on the Pub-2010 General Members Median Healthy Retiree mortality table. Mortality projected generationally from 2010 to 2020 using Scale MP-2020 and 75% of Scale MP-2020 for years after 2020.</p> <p>Post-retirement mortality rates for beneficiaries were based on the Pub-2010 General Members Median Contingent Survivor mortality table. Mortality projected generationally from 2010 to 2020 using Scale MP-2020 and 75% of Scale MP-2020 for years after 2020.</p>



The actuarial assumptions used in the valuation are based on the results of the most recent actuarial experience study, which covered the five-year period ending June 30, 2020. The experience study report is dated August 4, 2021.

**Paragraph 42:**

**(a): Discount rate (SEIR).** The discount rate used to measure the TPL at June 30, 2022 was 6.95%. There was no change in the SEIR since the Prior Measurement Date.

**(b): Projected cash flows.** The projection of cash flows used to determine the discount rate assumed that plan contributions from members and the State of Missouri will be made at the contribution rates as set in state statute:

- a. Employee contribution rate: 4.00% of salary for members hired on or after 1/1/2011; no contributions for members hired before 1/1/2011.
- b. Employer contribution rate: The actuarial required contribution rate is determined as of the Prior Measurement Date (June 30, 2020 for FYE June 30, 2022) and is subject to a minimum contribution rate of 58.45% until the plan is at least 80% funded.
- c. Administrative expenses in the prior year were projected forward with price inflation as an estimate for administrative expenses in the current and future years. The portion of expenses in future years allocated to the current members was based on the proportionate share of covered payroll in each year for the remainder of the existing members to the total covered payroll for all members.

Based on those assumptions, the Plan's FNP was projected to be available to make all projected future benefit payments of current Plan members. Therefore, the long-term expected rate of return on Plan investments of 6.95% was applied to all periods of projected benefit payments to determine the TPL.

The FNP projections are based on the Plan's financial status on the Measurement Date, the indicated set of methods and assumptions, and the requirements of GASB 67 and 68. As such, the FNP projections are not reflective of the cash flows and asset accumulations that would occur on an ongoing plan basis, reflecting the impact of future members. Therefore, the results of this test do not necessarily indicate whether or not the Plan will actually run out of money, the financial condition of the Plan, or the Plan's ability to make benefit payments in future years.

**(c): Long-term rate of return.** The long-term expected rate of return on pension plan investments is reviewed regularly as part of the experience study. The most recent experience analysis was performed and results provided in August, 2021. Generally, several factors are considered in evaluating the long-term rate of return assumption including long-term historical data, estimates inherent in current market data, and an analysis in which best-estimate ranges of expected future real rates of return (expected returns, net of investment expense and inflation), along with estimates of variability and correlations for each asset class, were developed by the System's investment consultant. These ranges were combined to develop the long-term expected rate of return by



weighting the expected future real rates of return by the target asset allocation percentage and then adding expected inflation. The capital market assumptions developed by investment consultants are often intended for use over a 10-year investment horizon and are not always useful in setting the long-term rate of return for funding pension plans which covers a longer timeframe.

**(d): Municipal bond rate.** A municipal bond rate was not used in determining the discount rate. If it were required, the rate would be 3.37% on the Measurement Date.

**(e): Periods of projected benefit payments.** Projected future benefit payments for all current plan members were projected through 2121.

**(f): Assumed asset allocation.** The target asset allocation and best estimates of real rates of return for each major asset class will be supplied by the System.

**(g): Sensitivity analysis.** This paragraph requires disclosure of the sensitivity of the NPL to changes in the discount rate. The following presents the NPL of the Plan, calculated using the discount rate of 6.95 percent, as well as the Plan’s NPL calculated using a discount rate that is 1-percentage-point lower (5.95 percent) or 1-percentage-point higher (7.95 percent) than the current rate:

	1% Decrease (5.95%)	Current Discount Rate (6.95%)	1% Increase (7.95%)
Total Pension Liability	\$692,442,777	\$630,043,013	\$576,563,801
Fiduciary Net Position	<u>190,449,086</u>	<u>190,449,086</u>	<u>190,449,086</u>
Net Pension Liability	\$501,993,691	\$439,593,927	\$386,114,715

**Paragraph 43:** The required information will be supplied by the System.



**Paragraph 44 (a) – (c):** This paragraph requires a schedule of changes in the NPL. The needed information is provided in the table below for reporting year ended June 30:

	Total Pension Liability (a)	Plan Fiduciary Net Position (b)	Net Pension Liability (a) – (b)
<b>Balances at June 30, 2021</b>	\$626,284,219	\$211,081,342	\$415,202,877
<b>Changes for the year:</b>			
Service Cost at end of year	13,303,763		13,303,763
Interest on TPL	42,073,646		42,073,646
Benefit term changes	0		0
Differences between expected and actual experience	(9,088,237)		(9,088,237)
Assumption changes	0		0
Employer contributions		39,228,848	(39,228,848)
Non-employer contributions		0	0
Employee contributions		1,550,712	(1,550,712)
Net investment income		(18,801,946)	18,801,946
Benefit payments, including member refunds	(42,530,378)	(42,530,378)	0
Administrative expenses		(79,492)	79,492
Other		0	0
<b>Net changes</b>	<u>3,758,794</u>	<u>(20,632,256)</u>	<u>24,391,050</u>
<b>Balances at June 30, 2022</b>	\$630,043,013	\$190,449,086	\$439,593,927

**Paragraph 44(d):** There is no special funding situation.



**Paragraph 45:**

**(a):** The Measurement Date of the NPL is June 30, 2022. The TPL as of June 30, 2022 was determined based on the annual actuarial valuation report prepared as of June 30, 2022.

**(b):** There is no special funding situation.

**(c):** There were no changes in the actuarial assumptions or other inputs since the Prior Measurement Date.

**(d):** There were no changes in the benefit terms since the Prior Measurement Date.

**(e):** There were no benefit payments in the measurement period attributable to the purchase of allocated insurance contracts.

**(f):** The information will be supplied by the System and employer.

**(g):** Please see Section III for the development of the PE.

**(h):** Since certain expense items are recognized over closed periods each year, the deferred portions of these items must be tracked annually. If the amounts will increase PE they are labeled Deferred Outflows of Resources. If the amounts serve to reduce PE they are labeled Deferred Inflows of Resources. The recognition of these amounts is accomplished on a level dollar basis, with no interest included in the deferred amounts. Experience gains/losses and the impact of changes in actuarial assumptions or other inputs, if any, are recognized over the average expected remaining service life of the active and inactive Plan members at the beginning of the measurement period. The difference between projected and actual earnings is recognized over a fixed five-year period.



The following tables provide a summary of the amounts of the Deferred Outflows of Resources and Inflows of Resources as of the Measurement Date (June 30, 2022). Per GASB 68, reporting of the differences between projected and actual earnings should be on a net basis, with only one Deferred Outflow or Inflow. This information is provided in the following table.

	Deferred Outflows of Resources	Deferred Inflows of Resources	Net Deferred Outflows/(Inflows) of Resources
Differences between expected and actual experience	\$0	\$14,719,040	(\$14,719,040)
Changes of assumptions	1,777,157	2,547,560	(770,403)
Differences between projected and actual earnings	<u>28,951,807</u>	<u>19,459,169</u>	<u>9,492,638</u>
Total	\$30,728,964	\$36,725,769	(\$5,996,805)





The following tables show the Deferred Outflows of Resources and Deferred Inflows of Resources separately to provide additional detail.

Deferred Outflows of Resources						
	June 30, 2021	Additions	Recognition	June 30, 2022		
Differences between expected and actual experience						
2018 Base	\$ 0	\$ 0	\$ 0	\$ 0	\$	0
2019 Base	237,680	0	237,680			0
2020 Base	0	0	0			0
2021 Base	0	0	0			0
2022 Base	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>		<u>0</u>
Total	\$ 237,680	\$ 0	\$ 237,680	\$		0
Changes of assumptions						
2018 Base	\$ 0	\$ 0	\$ 0	\$		0
2019 Base	1,219,874	0	1,219,874			0
2020 Base	3,298,695	0	1,521,538		1,777,157	
2021 Base	0	0	0			0
2022 Base	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>		<u>0</u>
Total	\$ 4,518,569	\$ 0	\$ 2,741,412	\$	1,777,157	
Differences between projected and actual earnings						
2018 Base	\$ 0	\$ 0	\$ 0	\$		0
2019 Base	1,963,050	0	981,526		981,524	
2020 Base	1,863,948	0	621,316		1,242,632	
2021 Base	0	0	0			0
2022 Base	<u>0</u>	<u>33,409,564</u>	<u>6,681,913</u>	<u>26,727,651</u>		<u>26,727,651</u>
Total	\$ 3,826,998	\$ 33,409,564	\$ 8,284,755	\$	28,951,807	
Total	\$ 8,583,247	\$ 33,409,564	\$ 11,263,847	\$	30,728,964	



Deferred Inflows of Resources					
	June 30, 2021	Additions	Recognition	June 30, 2022	
<b>Differences between expected and actual experience</b>					
2018 Base	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
2019 Base	0	0	0	0	0
2020 Base	7,767,787	0	3,582,928	4,184,859	
2021 Base	5,222,798	0	1,663,311	3,559,487	
2022 Base	<u>0</u>	<u>9,088,237</u>	<u>2,113,543</u>	<u>6,974,694</u>	
Total	\$ 12,990,585	\$ 9,088,237	\$ 7,359,782	\$ 14,719,040	
<b>Changes of assumptions</b>					
2018 Base	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
2019 Base	0	0	0	0	0
2020 Base	0	0	0	0	0
2021 Base	3,738,008	0	1,190,448	2,547,560	
2022 Base	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	\$ 3,738,008	\$ 0	\$ 1,190,448	\$ 2,547,560	
<b>Differences between projected and actual earnings</b>					
2018 Base	\$ 57,111	\$ 0	\$ 57,111	\$ 0	\$ 0
2019 Base	0	0	0	0	0
2020 Base	0	0	0	0	0
2021 Base	25,945,558	0	6,486,389	19,459,169	
2022 Base	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	\$ 26,002,669	\$ 0	\$ 6,543,500	\$ 19,459,169	
Total	\$ 42,731,262	\$ 9,088,237	\$ 15,093,730	\$ 36,725,769	



(i): Amounts reported as Deferred Outflows of Resources and Deferred Inflows of Resources related to pensions will be recognized in PE in future fiscal years as follows:

Year Ending June 30:	Deferred Outflows of Resources	Deferred Inflows of Resources	Net Deferred Outflows/(Inflows) of Resources
2023	\$9,806,291	\$15,036,619	(\$5,230,328)
2024	7,558,848	12,055,622	(4,496,774)
2025	6,681,913	8,999,463	(2,317,550)
2026	6,681,912	634,065	6,047,847
2027	0	0	0
Thereafter	0	0	0

(j): Based on information supplied by the System, the Missouri State Employees' Retirement System for the Judicial Retirement Plan receives no revenue from non-employer contributing entities.



## **SECTION V – REQUIRED SUPPLEMENTARY INFORMATION**

There are several tables of Required Supplementary Information (RSI) that need to be included in the Plan’s financial statements:

**Paragraphs 46(a) - (c):** The required tables of schedules are provided in Appendix A.

**Paragraph 47:** Significant methods and assumptions used in calculating the Actuarially Determined Contributions, if any, should be presented as notes to the schedule required by paragraph 46(c). In addition, for each of the schedules required by paragraph 46, information should be presented about factors that significantly affect trends in the amounts reported.

***Changes of benefit and funding terms:*** The following changes were made by the Missouri General Assembly and reflected in the valuation performed as of June 30 listed below:

None

### ***Changes in actuarial assumptions and methods:***

6/30/2021 valuation:

- Subsequent changes in the UAAL due to actuarial gains/losses or assumption changes are amortized as a level percentage of payroll, over closed 25-year periods.
- The salary increase assumption was changed from an age-based table to a flat 3.0% assumption.
- The mortality assumption was changed to reflect the Pub-2010 General Members Median Mortality Table. Future generational mortality improvement is reflected by using 100% of Scale MP-2020 through 2020 and 75% of Scale MP-2020 for years after 2020.
- The retirement assumption was adjusted to partially reflect observed experience. Rates are now unisex.
- The termination assumption was changed from a sex distinct, service-based table to a flat 2.0% for all years.
- The disability assumption was eliminated.
- The percentage of members who are assumed to be married was increased from 80% to 90%.

6/30/2020 valuation:

- The investment return assumption was lowered from 7.10% to 6.95%.
- The price inflation assumption was lowered from 2.35% to 2.25%.
- The payroll growth assumption was lowered from 2.35% to 2.25%.
- The wage growth assumption was lowered from 2.60% to 2.50%.



- The cost-of-living adjustment (COLA) assumption was lowered from 1.88% to 1.80% when no minimum COLA is in effect (80% of price inflation).

6/30/2019 valuation:

- The investment return assumption was lowered from 7.25% to 7.10%.
- The price inflation assumption was lowered from 2.50% to 2.35%.
- The payroll growth assumption was lowered from 2.50% to 2.35%.
- The wage growth assumption was lowered from 2.75% to 2.60%.
- The cost-of-living adjustment (COLA) assumption was lowered from 2.00% to 1.88% when no minimum COLA is in effect (80% of price inflation).

6/30/2018 valuation:

- The investment return assumption was lowered from 7.50% to 7.25%.
- The payroll growth assumption was lowered from 3.00% to 2.50%.
- The wage growth assumption was lowered from 3.00% to 2.75%.
- The asset smoothing method was changed from an open 5-year smoothing method to a closed 5-year smoothing method, with the difference between the actual investment return and the expected investment return on the market value of assets recognized evenly over a closed 5-year period. Due to the change in the asset smoothing method, a transitional plan was necessary. This transitional plan recognizes the unrecognized investment experience as of June 30, 2017 evenly over a closed 7-year period.
- The Unfunded Actuarially Accrued Liability (UAAL) amortization method was changed from one base over a closed 30-year period that began June 30, 2014 to a “layered” approach first effective June 30, 2018. The “Legacy UAAL”, as determined in the June 30, 2018 valuation, is amortized over a closed 30-year period. Subsequent changes in the UAAL due to actuarial gains/losses or assumption changes are separately financed by establishing amortization bases and payments, as a level percentage of payroll, over closed 30-year periods. Any change in the Plan’s benefit structure shall be amortized over a closed period of 20 years, as set out in state statutes. The total UAAL amortization payment is the sum of the payments for each of the amortization bases.

6/30/2017 valuation:

- The investment return assumption was lowered from 7.65% to 7.50%.

6/30/2016 valuation:

- The long-term rate of return was lowered from 8.00% to 7.65%.
- Post-retirement mortality table was updated from the RP-2000 combined healthy mortality table, projected to 2016 with Scale AA to the RP-2014 healthy annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 98%.
- Pre-retirement mortality table was updated from the RP-2000 combined healthy mortality table, projected to 2016 with Scale AA to the RP-2014 employee mortality table, projected from 2006 to 2026 with Scale MP-2015.



- The disabled mortality table was updated from the RP-2000 combined healthy mortality table, projected to 2016 with Scale AA and set forward 10 years to the RP-2014 disabled mortality table, projected from 2006 to 2026 with Scale MP-2015.
- Retirement rates were changed to better reflect actual experience of the Plan.
- Withdrawal rates were changed to better reflect actual experience of the Plan.
- The marriage assumption at retirement was increased from 70% to 80%.
- The marriage assumption for in-service deaths was increased from 70% to 80%.
- The asset smoothing period changed from an open 3-year period to an open 5-year period.

6/30/2014 valuation:

- For the 2014 valuation only, a one-time adjustment to the payroll growth from 3.00% to 14.38% was assumed for the year after the valuation date to reflect the average planned salary increase for 2015.
- The unfunded actuarial accrued liability amortization method was changed from a level percentage of payroll amortized over an open 30-year period to a level percentage of payroll amortized over a closed 30-year period beginning with the 6/30/2014 valuation.



***Method and assumptions used in calculations of actuarially determined contributions.***

The Plan is funded with contribution rates that are 4.00% of monthly salary for members hired on or after January 1, 2011 (0% for all other members) and an actuarially determined rate for the State of Missouri (subject to a minimum rate of 58.45% until the Plan is 80% funded on an actuarial basis). The Actuarially Determined Contributions in the *Schedule of Employer Contributions* are calculated as of the fiscal year two years prior to which contributions are reported.

The following actuarial methods and assumptions were used to determine the Actuarially Determined Contribution reported for the most recent Measurement Date, June 30, 2022 (based on the June 30, 2020 actuarial valuation):

Actuarial cost method	Entry Age Normal
Amortization method	Level percentage of payroll, closed
Remaining amortization period	Layered bases with the Legacy Base amortized over a 30-year period beginning June 30, 2018. All subsequent bases are amortized over a new 30-year period.
Asset valuation method	Closed 5-year smoothing based on actual market return. Deferred asset experience as of June 30, 2017 is recognized evenly over a closed 7-year period beginning June 30, 2018.
Price Inflation	2.25 percent
Payroll Growth	2.25 percent
Salary increases, including inflation	2.50 to 4.70 percent
Long-term Rate of Return, net of investment expense, including price inflation	6.95 percent
Cost-of-living adjustment	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).

Please see the information presented earlier in regard to Paragraph 47 for detailed information on the benefit changes and assumption changes that may have impacted the Actuarially Determined Contributions shown in the *Schedule of Employer Contributions*.



## **APPENDIX A**

# **REQUIRED SUPPLEMENTARY INFORMATION**





**Exhibit A**

**GASB 68 Paragraphs 46(a)  
SCHEDULE OF CHANGES IN THE NET PENSION LIABILITY**

	2022	2021	2020	2019	2018	2017	2016	2015	2014
<b>Total Pension Liability</b>									
Service Cost	13,303,763	12,872,644	13,119,646	13,573,453	12,997,198	12,945,567	10,932,097	10,613,686	8,990,293
Interest	42,073,646	42,004,675	42,458,800	41,710,768	41,018,371	40,617,091	37,755,240	36,161,612	34,013,615
Benefit term changes	0	0	0	0	0	0	0	0	0
Differences between expected and actual experience	(9,088,237)	(6,886,109)	(14,933,643)	978,884	(1,319,696)	(10,687,091)	(5,036,696)	5,103,664	13,360,614
Assumption changes	0	(4,928,456)	6,341,771	5,024,057	12,332,042	7,905,466	53,991,379	0	0
Benefit payments, including member refunds	<u>(42,530,378)</u>	<u>(41,625,546)</u>	<u>(39,622,268)</u>	<u>(37,593,049)</u>	<u>(35,657,248)</u>	<u>(33,984,725)</u>	<u>(32,989,714)</u>	<u>(31,245,906)</u>	<u>(29,406,625)</u>
<b>Net change in Total Pension Liability</b>	3,758,794	1,437,208	7,364,306	23,694,113	29,370,667	16,796,308	64,652,306	20,633,056	26,957,897
<b>Total Pension Liability - beginning</b>	626,284,219	624,847,011	617,482,705	593,788,592	564,417,925	547,621,617	482,969,311	462,336,255	435,378,358
<b>Total Pension Liability - ending (a)</b>	630,043,013	626,284,219	624,847,011	617,482,705	593,788,592	564,417,925	547,621,617	482,969,311	462,336,255
<b>Plan Fiduciary Net Position</b>									
Employer contributions	39,228,848	39,996,509	39,174,515	38,604,668	36,892,203	34,246,826	33,642,497	32,696,686	29,264,877
Employee contributions	1,550,712	1,448,428	1,314,570	1,138,101	902,319	786,745	661,206	488,193	294,810
Net investment income	(18,801,946)	44,049,707	8,162,709	6,055,836	10,677,666	4,680,131	28,082	(3,610,352)	21,394,750
Benefit payments, including member refunds	<u>(42,530,378)</u>	<u>(41,625,546)</u>	<u>(39,622,268)</u>	<u>(37,593,049)</u>	<u>(35,657,248)</u>	<u>(33,984,725)</u>	<u>(32,989,714)</u>	<u>(31,245,906)</u>	<u>(29,406,625)</u>
Administrative expenses	(79,492)	(75,822)	(74,450)	(72,141)	(181,595)	(150,387)	(136,983)	(123,015)	(105,693)
Other	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>(68,711)</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<b>Net change in Plan Fiduciary Net Position</b>	(20,632,256)	43,793,276	8,955,076	8,133,415	12,564,634	5,578,590	1,205,088	(1,794,394)	21,442,119
<b>Plan Fiduciary Net Position – beginning</b>	211,081,342	167,288,066	158,332,990	150,199,575	137,634,941	132,056,351	130,851,263	132,645,657	111,203,538
<b>Plan Fiduciary Net Position - ending (b)</b>	190,449,086	211,081,342	167,288,066	158,332,990	150,199,575	137,634,941	132,056,351	130,851,263	132,645,657
<b>Net Pension Liability - ending (a) - (b)</b>	439,593,927	415,202,877	457,558,945	459,149,715	443,589,017	426,782,984	415,565,266	352,118,048	329,690,598

Note: Schedule is intended to show 10-year trend. Additional years will be reported as they become available.



**Exhibit A (cont.)**

**GASB 68 Paragraphs 46(b)  
SCHEDULE OF CHANGES IN THE NET PENSION LIABILITY**

	2022	2021	2020	2019	2018	2017	2016	2015	2014
Total Pension Liability	630,043,013	626,284,219	624,847,011	617,482,705	593,788,592	564,417,925	547,621,617	482,969,311	462,336,255
Plan Fiduciary Net Position	190,449,086	211,081,342	167,288,066	158,332,990	150,199,575	137,634,941	132,056,351	130,851,263	132,645,657
Net Pension Liability	439,593,927	415,202,877	457,558,945	459,149,715	443,589,017	426,782,984	415,565,266	352,118,048	329,690,598
Plan Fiduciary Net Position as a percentage of the Total Pension Liability	30.23%	33.70%	26.77%	25.64%	25.30%	24.39%	24.11%	27.09%	28.69%
Covered payroll	63,333,626	63,105,884	61,402,061	60,594,362	59,417,302	58,591,661	57,421,016	55,656,457	49,587,936
Employers' Net Pension Liability as a percentage of covered payroll	694.09%	657.95%	745.18%	757.74%	746.57%	728.40%	723.72%	632.66%	664.86%

Note: Schedule is intended to show 10-year trend. Additional years will be reported as they become available.



**Exhibit B**  
**GASB 68 Paragraphs 46(c)**  
**SCHEDULE OF EMPLOYER CONTRIBUTIONS**  
**Fiscal Year Ended June 30**

	2022	2021	2020	2019	2018	2017	2016	2015	2014
Actuarially determined employer contribution	\$39,228,848	\$39,996,509	\$39,174,515	\$38,604,668	\$36,892,203	\$32,670,710	\$31,604,527	\$32,696,686	\$29,264,877
Actual employer contributions	<u>39,228,848</u>	<u>39,996,509</u>	<u>39,174,515</u>	<u>38,604,668</u>	<u>36,892,203</u>	<u>34,246,826</u>	<u>33,642,497</u>	<u>32,696,686</u>	<u>29,264,877</u>
Annual contribution deficiency (excess)	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>(\$1,576,116)</u>	<u>(\$2,037,970)</u>	<u>\$0</u>	<u>\$0</u>
Covered payroll	\$63,333,626	\$63,105,884	\$61,402,061	\$60,594,362	\$59,417,302	\$58,591,661	\$57,421,016	\$55,656,457	\$49,587,936
Actual contributions as a percentage of covered payroll	61.94%	63.38%	63.80%	63.71%	62.09%	58.45%	58.59%	58.75%	59.02%

Note: Most of the information prior to 2017 was produced by the prior actuary.



## **APPENDIX B**

### **SUMMARY OF PLAN PROVISIONS**

#### **Age and Service Retirement**

##### ***Eligibility for Unreduced Benefit (for Members Hired Before 1/1/2011)***

The earliest of attaining:

- (1) At least 62 with 12 years of creditable service.
- (2) At least 60 with 15 years of creditable service.
- (3) At least 55 with 20 years of creditable service.

##### ***Eligibility for Unreduced Benefit (for Members Hired On or After 1/1/2011)***

The earliest of attaining:

- (1) At least 67 with 12 years of creditable service.
- (2) At least 62 with 20 years of creditable service.

##### ***Benefit Amount***

50% of compensation

#### **Early Retirement**

##### ***Eligibility for Reduced Benefit (for Members Hired Before 1/1/2011)***

Age 60

##### ***Benefit Amount***

- (1) If between 60 and 62, years of service divided by 15 multiplied by 50% of compensation.
- (2) If at least 62, years of service divided by 12 and multiplied by 50% of compensation.

##### ***Eligibility for Reduced Benefit (for Members Hired On or After 1/1/2011)***

Age 62

##### ***Benefit Amount***

- (1) If between 60 and 67, years of service divided by 20 multiplied by 50% of compensation.
- (2) If at least 67, years of service divided by 12 and multiplied by 50% of compensation.

#### **Compensation used for Benefit Determination**

The annual salary at date of termination of the highest position held.



## Vested Deferred Benefits

Benefits for employees who terminate prior to eligibility for an immediate benefit are considered to be vested. Benefits commence once the individual qualifies for normal or early retirement based on age and service.

## Death Benefits

### *Death Prior to Retirement*

50% of the benefit the member would have been eligible to receive based on service to age 70 is payable to an eligible spouse or minor children.

### *Death After Retirement*

50% of the benefit the retired member was receiving at the date of death to an eligible surviving spouse for members hired before January 1, 2011.

## Disability Benefits

Disability benefits become payable at the time the member is eligible for normal retirement (50% of salary for remainder of term) and are computed based on the service that would have accrued if active employment had continued until normal retirement age, and member's compensation while an active employee.

## Post-Retirement Benefit Adjustments

Benefits are increased to benefit recipients (including survivors) annually in accordance with the following formulas:

Increase in CPI	Formula 1 Benefit Increase	Formula 2 Benefit Increase
5.00% or less	4.00%	80% of CPI increase
5.01% - 6.24%	80% of CPI increase	80% of CPI increase
6.25% or more	5.00%	5.00%

Members first hired prior to August 28, 1997 receive COLAs based on Formula 1 until an aggregate increase of 65% is reached. At that point, subsequent COLAs based on Formula 2 are granted.

Members first hired on or after August 28, 1997 receive COLAs based solely on Formula 2.

Members hired prior to January 1, 2011 who work beyond the later of age 60 or the date when first eligible for age and service retirement will have their monthly benefit increased upon retirement. The percentage increase is equal to all COLAs for the years between (i) the later of age 60 or the date when first eligible for age and service retirement and (ii) date of actual retirement, not to exceed 65%.



**Member Contributions**

For members hired prior to 1/1/2011:       None

For members hired on or after 1/1/2011:   4.00% of salary, with interest credited at 4.00%.



## APPENDIX C

### STATEMENT OF ACTUARIAL ASSUMPTIONS

An experience study which analyzed the System's economic and demographic assumptions was performed in 2021 and the results were presented to the Board. The assumptions listed below are a result of that experience study. The next experience study is scheduled for 2026.

1. Investment Return	6.95%, compounded annually, net of investment expenses.
2. Inflation	2.25% per year
3. Salary Increases	3.00% per year (2.25% Inflation + 0.25% Productivity + 0.50% Merit)
4. Payroll Growth	2.25% per year
5. Cost-of-Living Adjustment (COLA)	4.00% on a compounded basis when a minimum COLA of 4.00% is in effect.  1.80% on a compounded basis when no minimum COLA is in effect.
6. Administrative Expenses	Actual prior year expenses, included in normal cost rate.

#### **Demographic Assumptions**

1. Mortality	The mortality assumption includes an appropriate level of conservatism that reflects expected future mortality improvement.
a. Post-retirement (Retirees)	Pub-2010 General Members Median Healthy Retiree mortality table. Mortality projected generationally from 2010 to 2020 using Scale MP-2020 and 75% of Scale MP-2020 for years after 2020.
b. Post-retirement (Beneficiaries)	Pub-2010 General Members Median Contingent Survivor mortality table. Mortality projected generationally from 2010 to 2020 using Scale MP-2020 and 75% of Scale MP-2020 for years after 2020.
c. Pre-retirement	Pub-2010 General Members Median Employee mortality table. Mortality projected generationally from 2010 to 2020 using Scale MP-2020 and 75% of Scale MP-2020 for years after 2020.



2. Retirement

**Members Hired Before January 1, 2011**

<b><u>Early Retirement</u></b>	
<b>Age</b>	<b>Rate</b>
62-69	5%
70	100

<b><u>Unreduced Retirement</u></b>	
<b>Age</b>	<b>Rate</b>
55	10.0%
56-63	3.0
64-66	10.0
67	17.5
68	25.0
69	35.0
70	100.0

**Members Hired On or After January 1, 2011**

<b><u>Unreduced Retirement</u></b>	
<b>Age</b>	<b>Rate</b>
62	10%
63-66	3
67	25
68-69	20
70	100

3. Termination: 2.0% per year

4. Disability: None





## Other Assumptions

- |  |   |
|--|---|
| 1. Form of Payment                               | Hired before 1/1/2011 – 50% joint and survivor<br>Hired on or after 1/1/2011 – Straight life annuity  |
| 2. Marital Status                                |   |
| a. Percent married                               | 90% married   |
| b. Spouse's age                                  | Females assumed to be four years younger than males.  |
| 3. Pay Increase Timing                           | Beginning of the fiscal year.   |
| 4. Decrement Timing                              | Decrements of all types are assumed to occur mid-year.  |
| 5. Eligibility Testing                           | Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.  |
| 6. Benefit Service                               | Exact fractional service is used to determine the amount of the benefit payable.  |
| 7. Decrement Relativity                          | Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.   |
| 8. Decrement Operation                           | Disability and withdrawal do not operate during normal retirement eligibility.  |
| 9. Other Liability Adjustments                   | None  |
| 10. Incidence of Contributions                   | Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report, and the actual payroll payable at the time contributions are made. New entrant normal cost contributions are applied to the funding of new entrant benefits. |
| 11. Forfeitures                                  | For members hired on or after January 1, 2011 only: Value the greater of the refund amount or the present value of the deferred benefit.  |
| 12. Salary and Benefit Limits                    | For purposes of the valuation, no limits were applied to member compensation or benefits.   |
| 13. Commencement Age for Deferred Vested Benefit | Normal retirement age   |



## **Data Adjustments**

Active and retired member data was reported as of May 31, 2022. It was brought forward to June 30, 2022 by adding one month of service for all active members, one month of contributions and interest for Judicial Plan 2011 members, and the June COLA for certain retired members. Financial information continues to be reported as of June 30. This procedure was instituted to provide sufficient time for the Board of Trustees to certify the appropriate contribution rate prior to the October 1 statutory deadline.

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

## **TECHNICAL VALUATION PROCEDURES**

### **Other Valuation Procedures**

Salary increases are assumed to apply to annual amounts.

Decrements are assumed to occur mid-year, except that immediate retirement is assumed for those who are at or above the age at which retirement rates are 100%.

No actuarial liability is included for participants who terminated without being vested prior to the valuation date, except those due a refund of contributions.