



# Public School Retirement System of the City of St. Louis, Missouri

## Actuarial Valuation Report

Plan Year

January 1, 2022 – December 31, 2022

June 2022



**BUCK**



231 South Bemiston  
Suite 400  
Clayton, MO 63105

June 2022

Ms. Susan Kane  
*Executive Director*  
PSRS of the City of St. Louis  
3641 Olive Street, Suite 300  
St. Louis, MO 63108-3601

**Re: Actuarial Certification of January 1, 2022 Valuation**

Dear Members of the Public School Retirement System of the City of St. Louis Board:

Buck Global, LLC (Buck) has been retained to complete the actuarial valuation for the Public School Retirement System of the City of St. Louis ("System") for the plan year beginning January 1, 2022. The results of that valuation are included in this report.

The computations herein were performed as of January 1, 2022. They were determined on the basis of employee data and financial data furnished as of January 1, 2022 and December 31, 2021, respectively, by System staff. The actuary did not verify the data submitted but did perform tests for consistency and reasonableness.

The purposes of the valuation are to:

- (1) determine the required annual contributions from the board of education, the retirement system, and the charter schools; and
- (2) present the valuation results of the System as of January 1, 2022.

This report is submitted in accordance with Section 169.450-16 Revised Statutes of Missouri (R.S. Mo.). The required contribution to the System from the board of education, the retirement system, and the charter schools is computed in accordance with Section 169.490 R.S. Mo. The amount of the required contribution is stated in Section 1.2 of this report. Information with respect to financial disclosures under GASB 67 and 68 may be found in a separate report.

In preparing this valuation, we have employed generally accepted actuarial methods and assumptions, in conjunction with member data and financial information provided to us by the System, to determine a reasonable and sound value for the System liability. The member data has not been audited, but it has been reviewed and found to be consistent, both internally and with prior years' data. The validity of the valuation results is dependent upon the accuracy of the data and financial information provided.

In our opinion, the actuarial assumptions used are reasonable, taking into account the experience of the System and reasonable long-term expectations, and represent our best estimate of the anticipated long-term experience under the System. The actuary performs an analysis of System experience periodically and recommends changes if, in the opinion of the actuary, assumption changes are needed to more accurately reflect expected future experience. The Experience Study for the period January 1, 2016 to December 31, 2020 was prepared by Buck and approved by the Board for use beginning with the January 1, 2022 actuarial valuation and will remain in effect for valuation purposes until such time as the Board adopts revised assumptions. The next Experience Study will be based on the period

from January 1, 2021 to December 31, 2025 and upon approval by the Board will be the basis of valuations performed from January 1, 2026 through January 1, 2031. A summary of all assumptions and methods is presented in Section 3.8 of this report.

Where presented, references to “funded ratio” and “unfunded accrued liability” typically are measured on an actuarial value of assets basis. It should be noted that the same measurements using market value of assets would result in different funded ratios and unfunded accrued liabilities. Moreover, the funded ratio presented is appropriate for evaluating the need and level of future contributions but makes no assessment regarding the funded status of the plan if the plan were to settle (i.e. purchase annuities) for a portion or all of its liabilities.

Future actuarial measurements and contribution requirements may differ from those determined in the valuation because of:

- (1) differences between actual experience and anticipated experience based on the assumptions;
- (2) changes in actuarial assumptions or methods;
- (3) changes in statutory provisions;
- (4) differences between actuarially required contributions and actual contributions.

Buck prepared this report for use by the Retirement System and its auditors in reviewing the operation of the System, including the determination of contributions to be made to the System. Use of this report by other parties or for any other purpose may not be appropriate and may result in mistaken conclusions due to failure to understand applicable assumptions, methodologies, or the inapplicability of the report for that purpose. Because of the risk of misinterpretation of actuarial results, Buck recommends requesting its advance review of any statement, document, or filing to be based on information contained in this report. Buck will accept no liability for any such statement, document or filing made without its prior review.

Actuarial Standards of Practice (“ASOPs”) 27 and 35 ask the actuary to disclose the information and analysis used to support the actuary’s determination that the assumptions selected by the plan sponsor do not significantly conflict with what, in the actuary’s professional judgment, are reasonable for the purpose of the measurement. In the case of the plan sponsor’s selection of expected return on assets (“EROA”), the signing actuaries have used economic information and tools provided by Buck’s Financial Risk Management (“FRM”) practice. A spreadsheet tool created by the FRM team converts averages, standard deviations, and correlations from Buck’s Capital Markets Assumptions (“CMA”) that are used for stochastic forecasting into approximate percentile ranges for the arithmetic and geometric average returns. It is intended to suggest possible reasonable ranges for EROA without attempting to predict or select a specific best estimate rate of return. It takes into account the duration (horizon) of investment and the target allocation of assets in the portfolio to various asset classes. Based on the actuary’s analysis, including consistency with other assumptions used in the valuation and the percentiles generated by the spreadsheet described above, the actuary believes the EROA does not significantly conflict with what, in the actuary’s professional judgment, is reasonable for the purpose of the measurement.

Actuarial Standard of Practice No. 56 provides guidance to actuaries when performing actuarial services with respect to designing, developing, selecting, modifying, using, reviewing, or evaluating models. Buck uses third-party software in the performance of annual actuarial valuations and projections. The model is intended to calculate the liabilities associated with the provisions of the plan using data and assumptions as of the measurement date under the funding rules specified in this report. The output from the third-party vendor software is used as input to an internally developed model that applies applicable funding rules to the derived liabilities and other inputs, such as plan assets and contributions, to generate many of the exhibits found in this report. Buck has an extensive review process in which the results of the liability calculations are checked using detailed sample life output, changes from year to year are summarized by source, and significant deviations from expectations are investigated. Other funding outputs and the internal model are similarly reviewed in detail and at a higher level for accuracy, reasonability, and consistency with prior results. Buck also reviews the third-party model when significant changes are made to the software. This review is performed by experts within Buck who are familiar with applicable funding rules, as well as the manner in which the model generates its output. If significant changes are made to the internal model, extra checking and review are completed. Significant changes to the internal model that are applicable to multiple clients are generally developed, checked, and reviewed by multiple experts within Buck who are familiar with the details of the required changes.

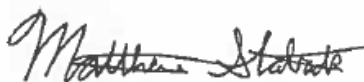
The undersigned meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein, and is available to answer questions regarding this report.

We believe that the assumptions and methods used for funding purposes are individually and in aggregate, reasonable and in combination represent a best estimate of anticipated experience under the plan. We believe that this report conforms with the requirements of the Missouri statutes, and where applicable, other federal and accounting laws, regulations and rules, as well as actuarial principles and practices in accordance with all applicable Actuarial Standards of Practice (ASOPs).

Sincerely,



Michael A. Ribble, FSA, EA, MAAA, FCA  
Principal, Wealth Consulting



Matthew Staback, FSA, EA, MAAA, CERA, FCA  
Senior Consultant, Wealth Consulting

Buck Global, LLC (Buck)

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## Report Highlights

This report has been prepared by Buck to:

- Present the results of a valuation of the Public School Retirement System of the City of St. Louis (“System”) as of January 1, 2022; and
- Determine the required annual contribution for 2023.

This report is divided into four sections:

Section 1 contains the results of the valuation. It includes the experience of the System during the 2021 plan year, the actuarially required costs, and funded levels.

Section 2 contains asset information. It includes market value of assets, the calculation of actuarial value of assets, the expense & contingency reserve, and asset returns.

Section 3 describes the basis of the valuation. It summarizes the System provisions, provides information relating to the System members, and describes the funding methods and actuarial assumptions used in determining liabilities and costs. Also included is historical information about the System.

Section 4 contains the Actuarial Standards of Practice (ASOP) 51 disclosure. This section will provide insight of potential risks to the system.

### Experience Gains and Losses

Actuarial gains (or losses) result from differences between the actual experience of the System and the expected experience based upon the actuarial assumptions. Annual gains (or losses) should be expected because short-term deviations from expected long-term average experience are common.

For the 2021 plan year, total (net) actuarial gain due to plan experience was about \$27.0 million. The experience may be broken into two components:

1. **Investment:** Approximately \$36.9 million gain is attributable to the System’s actuarial rate of return on assets, which was 11.76% for plan year 2021, or 4.26% higher than the assumed rate of return of 7.50%. A sizeable portion of the gain resulted from the implementation of a new actuarial value of assets (AVA) method for this valuation. Under the new method, the AVA was set equal to the market value of assets less expense & contingency reserve as of January 1, 2022. By comparison, the rate of return on the market value of assets during plan year 2021 was 12.51%.
2. **Actuarial Liability:** Approximately \$9.9 million loss is attributable to the demographic experience of the Plan. The Plan experienced higher than expected salary increases during 2021, which was the main source of the loss. However, the Plan’s total liability loss was mitigated by actuarial gains resulting from higher than expected terminations (prior to retirement eligibility) during 2021.

### Actuarial Assumption and Method Changes

For the 2022 valuation, significant actuarial assumption and method changes were implemented as a result of the experience study completed in December 2021. The assumptions changes increased the Actuarial Accrued Liability as of January 1, 2022 by approximately \$12.3 million. A detailed description of the actuarial assumptions and methods appears in section 3.8.

## Normal Cost

The annual normal cost contribution with an interest adjustment increased from \$17,821,684 in 2021 to \$22,318,781 in 2022. This increase is primarily due to the changes in the Plan's actuarial cost method to Entry Age Normal. Covered payroll decreased from \$264.7 million to \$259.4 million. The annual normal cost rate as a percentage of covered payroll increased from 6.73% in 2021 to 8.60% in 2022. It should be noted that the 2021 normal cost rate was reduced by about 8.56% of covered payroll to account for expected member contributions. For 2022, the expected member contributions are accounted for in the Actuarially Determined Employer Contribution.

## Amortization Payment of Unfunded Actuarial Accrued Liability

The actuarial accrued liability contribution is determined as the amount necessary to amortize the remaining Unfunded Actuarial Accrued Liability (UAAL) over a period of 15 years from January 1, 2022. The Board of Trustees acted to redetermine the UAAL for the January 1, 2022 Valuation. The Plan implemented a 15-year, level dollar, closed amortization period with layered amortization for future changes. The initial UAAL will be paid off in 15 years. Any deviations in UAAL due to actuarial gains and losses, assumptions changes, and plan amendments will be amortized over a new 15-year period. As a result of the changes in method, the total amortization payment increased from \$27,438,261 to \$35,732,356. The amortization payment component of the contribution rate increased from 10.37% to 13.77% of covered payroll.

## Actuarially Determined Employer Contribution

The Actuarially Determined Employer Contribution (ADEC) is determined annually and equals the normal cost with an interest adjustment plus the Amortization Payment of UAAL with an interest adjustment less expected member contributions. Expected member contributions for 2022 were 8.10% of covered payroll. For plan year 2022, the actuarially determined employer contribution is \$37,037,171, as compared to \$45,259,945 for plan year 2021. This decrease is primarily due to the changes in assumptions and methods from the 2021 Experience Study, the large asset gain in 2021, and resetting the actuarial value of assets equal to the market value of assets less expense & contingency reserve. The total employer cost rate decreased from 17.10% to 14.28%.

## Required contribution and timing

In 2001, the Board of Education agreed to institute a one-year lag for payments of the annual required contributions due from SLPS for future years. Therefore, this actuarial valuation is used to determine the annual required contribution (ARC) payment from SLPS for plan year 2022, due to the Plan no later than December 31, 2023. Due to legislation passed August 28, 2017, the contribution rate is set as a fixed percentage rather than an actuarially determined percentage. Because of the statutory required contribution rate, the dollar amount of the ARC due from SLPS no later than December 31, 2023, decreased from \$26,692,454 for plan year 2021 to \$23,639,359 for plan year 2022.

As a percentage of covered payroll in plan year 2022, the contribution rate decreased from 14.50% for plan year 2021 to 14.00% for plan year 2022. Charter Schools pay both employer and member contributions as they occur shortly after each payroll period; therefore, this actuarial valuation is used to determine the contribution rate of 14.00% that Charter Schools should be paying beginning with payroll periods ending on or after January 1, 2022.

According to the 2022 Actuarial Valuation Results and timing of payments found in this report, it is important to note that on an actuarially determined and sound basis, SLPS and the Charter Schools should be paying an annual contribution rate of 14.28% versus the 14.00% contribution rate for plan year 2022 as required by statute. The effects on the System's actuarial soundness due to the decreasing statutory required contribution rate schedule will be presented in future annual actuarial valuation reports as they occur.



# Summary and Comparison of Principal Valuation Results

## Annual Required Contribution

	Board of Education	Retirement System	Charter Schools	Total
<b>2022</b>				
Normal Cost Contribution	\$ 14,525,814	\$ 50,353	\$ 7,742,614	\$ 22,318,781
Actuarial Accrued Liability Contribution	23,255,821	80,615	12,395,920	35,732,356
Member Contributions	<u>(13,676,596)</u>	<u>(47,410)</u>	<u>(7,289,960)</u>	<u>(21,013,966)</u>
Actuarially Determined Employer Contribution (ADEC)	\$ 24,105,039	\$ 83,558	\$ 12,848,574	\$ 37,037,171
Covered Payroll	168,852,563	585,315	90,002,539	259,440,417
ADEC as % of Covered Payroll	14.28%	14.28%	14.28%	14.28%
Statutory Required Contribution Rate	14.00%	14.00%	14.00%	14.00%
Statutory Annual Required Contribution (ARC)	\$ 23,639,359	\$ 81,944	\$ 12,600,355	\$ 36,321,658
<b>2021</b>				
Normal Cost Contribution	\$ 12,395,193	\$ 37,245	\$ 5,389,246	\$ 17,821,684
Actuarial Accrued Liability Contribution	<u>19,083,636</u>	<u>57,343</u>	<u>8,297,282</u>	<u>27,438,261</u>
Actuarially Determined Employer Contribution (ADEC)	\$ 31,478,829	\$ 94,588	\$ 13,686,528	\$ 45,259,945
Covered Payroll	184,085,888	553,144	80,037,813	264,676,845
ADEC as % of Covered Payroll	17.10%	17.10%	17.10%	17.10%
Statutory Required Contribution Rate	14.50%	14.50%	14.50%	14.50%
Statutory Annual Required Contribution (ARC)	\$ 26,692,454	\$ 80,206	\$ 11,605,483	\$ 38,378,143

	January 1, 2022	January 1, 2021
<b>System Assets</b>		
Expense and Contingency Reserve	\$ 29,625,803	\$ 30,004,728
Market Value, Excluding Expense & Contingency Reserve	\$ 943,201,853	\$ 884,772,226
Actuarial Value	\$ 943,201,853	\$ 894,251,149
<b>System Liabilities</b>		
Unfunded Actuarial Accrued Liability (UAAL) <sup>1</sup>	\$ 336,645,221	\$ 242,200,815
Entry Age Normal (EAN) Actuarial Accrued Liability	\$ 1,279,847,074	\$ 1,257,782,934
<b>EAN Funding Ratio</b>		
Actuarial Value Funding Ratio	73.7%	71.1%

<sup>1</sup>January 1, 2021 UAAL calculated on the Frozen Entry Age actuarial cost method on the Plan's unfunded actuarial accrued liability reestablished on January 1, 2006. January 1, 2022 UAAL calculated on the Entry Age Normal cost method.

# Analysis of the Valuation

## (1) Investment Experience

Our actuarial calculations were based upon the assumption that the System's assets earn 7.50% for 2021. The approximate market value rate of return during 2021 was 12.51%. The approximate actuarial value rate of return was 11.76%. The actuarial value rate of return accounts for the Plan's actuarial value of assets being reset as of January 1, 2022 equal to market value of assets less expense & contingency reserve.

## (2) Demographic Experience

The number of active members decreased from 4,984 to 4,594 for the period. The average service of active members decreased from 8.15 to 8.11, the average age increased slightly, and the average covered payroll increased by \$3,369 (6.3%). There were small changes in the inactive statistics. The membership statistics are provided in Sections 3.3 through 3.7 of this report.

## (3) Salary Increases

The average covered payroll increased by 6.3% between January 1, 2021 and January 1, 2022. Total annual covered payroll decreased by 2.0% between January 1, 2021 and January 1, 2022.

## (4) Changes in Methods from the Prior Valuation

A full detail summary of the methods can be found in section 3.8 of the report. The Experience Study for the period January 1, 2016 to December 31, 2020 was prepared by Buck and approved by the Board for use beginning with the January 1, 2022 actuarial valuation. The following changes in methods have been made effective with the January 1, 2022 valuation:

1. Actuarial value of assets set equal to market value of assets less expense and contingency reserve as of January 1, 2022.
2. Five-year smoothing of assets based on difference between the actual investment income and expected for 2022 and later years.
3. Limit the actuarial value of assets to not less than 80% and not greater than 120% of the market value of assets less expense and contingency reserve.
4. Plan's actuarial cost method changed from Unfunded Frozen Actuarial Accrued Liability to Entry Age Normal Actuarial Accrued Liability.
5. Implemented a 15-year, level dollar, closed amortization period with layered amortization for future changes.
6. One-half year's interest adjustment at the valuation's interest rate to better reflect the timing of contributions.

## (5) Changes in Assumptions from the Prior Valuation

A full detail summary of the assumptions can be found in section 3.8 of the report. The Experience Study for the period January 1, 2016 to December 31, 2020 was prepared by Buck and approved by the Board for use beginning with the January 1, 2022 actuarial valuation. The following changes in assumptions have been made effective with the January 1, 2022 valuation:

1. Lowered the investment return assumption from 7.50% to 7.00%, net of investment expenses.
2. Updated mortality from RP-2014 with mortality improvement scale MP-2015 to PubG-2010 (below median), amounted weighted with mortality improvement scale MP-2021.
3. Updated retirement, withdrawal, and disability rates.
4. Decreased the deferred vested members assumption from 150% to 125% of the member's total accumulated contributions.

## Analysis of the Valuation, continued

### (6) Changes in Benefit Provisions from the Prior Valuation

There have been no changes in provisions since the prior valuation.

### (7) Other Changes

There have been no other changes since the prior valuation.

### (8) Summary

The overall effect of experience during the period resulted in any increase change in the Entry Age Normal funding ratio utilizing the actuarial value of assets from 71.1% to 73.7%. The total actuarially determined contribution rate decreased from 17.10% to 14.28% of covered payroll.

# Section 1 - Valuation Results

This section sets forth the results of the actuarial valuation.

- Section 1.1 Determination of Actuarially Determined Employer Contributions (ADEC)
- Section 1.2 Required Annual Contribution
- Section 1.3 Development of Actuarial Experience Gain (Loss)
- Section 1.4 Actuarial Balance Sheet as of January 1, 2022
- Section 1.5 Prioritized Solvency Test

## Section 1 (continued)

### 1.1 Determination of Actuarially Determined Employer Contributions (ADEC)

	<u>2022</u>	<u>2021</u>
A. Number of Participants		
Active	4,594	4,984
Tier 1 Active	2,446	3,026
Tier 2 Active	2,148	1,958
In Pay Status	4,363	4,386
Deferred Vested	940	703
Nonvested with Balance	<u>3,316</u>	<u>2,857</u>
TOTAL	13,213	12,930
B. Covered Payroll	\$ 259,440,417	\$ 264,676,845
i. Tier 1: Members original Date of Hire prior to January 1, 2018	155,711,403	174,700,395
ii. Tier 2: Members original Date of Hire on or after January 1, 2018	103,729,014	89,976,450
C. Annual Benefits Payable to Retired Participants and Beneficiaries	\$ 105,401,769	\$ 105,577,651
D. Actuarial Liability - Entry Age Normal		
Active	\$ 339,125,635	\$ 329,019,928
In Pay Status	882,739,730	879,008,936
Deferred Vested	42,230,323	36,797,875
Nonvested with Balance	<u>15,751,386</u>	<u>12,956,195</u>
TOTAL	\$1,279,847,074	\$1,257,782,934
E. Plan Assets - Actuarial Value	\$ 943,201,853	\$ 894,251,149
F. Entry Age Normal Unfunded Actuarial Accrued Liability (D. - E.) <sup>2</sup>	\$ 336,645,221	\$ 363,531,785
G. Entry Age Normal Funded Ratio (D. / E.)	73.70%	71.10%
H. Total Normal Cost (Entry Age Normal for 2022, Frozen Entry Age for 2021)	\$ 21,576,380	\$ 17,177,527
I. Total Normal Cost with Interest Adjustment	\$ 22,318,781	\$ 17,821,684
As a Percentage of Covered Payroll	8.60%	6.73%
J. Amortization Payment of Unfunded Actuarial Accrued Liability <sup>3</sup>	\$ 34,543,772	\$ 27,438,261
K. Amortization Payment with Interest Adjustment <sup>4</sup>	35,732,356	27,438,261
As a Percentage of Covered Payroll	13.77%	10.37%
L. Actuarially Determined Contribution (I. + K.)	\$ 58,051,137	\$ 45,259,945
M. Expected Member Contributions <sup>5</sup>	\$ 21,013,966	N/A
As a Percentage of Covered Payroll	8.10%	
N. Actuarially Determined Employer Contribution (L. - M.)	\$ 37,037,171	\$ 45,259,945
As a Percentage of Covered Payroll	14.28%	17.10%

<sup>2</sup>Unfunded Frozen Actuarial Accrued Liability (UAAL) as of January 1, 2021 under prior cost method was \$242,200,815.

<sup>3</sup>See section 3.8 for details on changes in Plan's amortization method effective January 1, 2022.

<sup>4</sup>Interest adjustment on Amortization Payment effective January 1, 2022.

<sup>5</sup>Tier 1 Expected Member Contributions are 7.5% in 2022 and 7.0% in 2021. Tier 2 Contributions are 9.0% in 2021 and 2022.

## Section 1 (continued)

### 1.2 Required Annual Contribution

Actuarially Determined Employer Contribution (ADEC):

	Board of Education	Retirement System	Charter Schools	Total
Normal Cost Contribution	\$ 14,525,814	\$ 50,353	\$ 7,742,614	\$ 22,318,781
Actuarial Accrued Liability Contribution	23,255,821	80,615	12,395,920	35,732,356
Member Contributions	<u>(13,676,596)</u>	<u>(47,410)</u>	<u>(7,289,960)</u>	<u>(21,013,966)</u>
Actuarially Determined Employer Contribution (ADEC)	\$ 24,105,039	\$ 83,558	\$ 12,848,574	\$ 37,037,171
Covered Payroll	168,852,563	585,315	90,002,539	259,440,417
ADEC as % of Covered Payroll	14.28%	14.28%	14.28%	14.28%

Statutory Annual Required Contribution (ARC):

	Board of Education	Retirement System	Charter Schools	Total
Covered Payroll	\$ 168,852,563	\$ 585,315	\$ 90,002,539	\$ 259,440,417
ARC as % of Covered Payroll	14.00%	14.00%	14.00%	14.00%
Statutory Annual Required Contribution (ARC)	\$ 23,639,359	\$ 81,944	\$ 12,600,355	\$ 36,321,658

## Section 1 (continued)

### 1.3 Development of Actuarial Experience Gain (Loss)

A. Asset gain (loss)	
1 Actuarial value of assets 1/1/2021	894,251,149
2 Contributions (Total)	62,107,170
3 Benefit payments	(113,687,442)
4 Expense	(1,523,071)
5 Interest on (1), (2), and (3) at 7.50%	65,113,461
6 Expected actuarial value of assets as 1/1/2022	906,261,267
7 Actual actuarial value of assets as of 1/1/2022 <sup>6</sup>	943,201,853
8 Gain (loss) due to assets: (7) - (6)	36,940,586
B. Liability gain (loss) <sup>7</sup>	
1 Actuarial liability as of 1/1/2021	1,257,782,934
2 Normal cost as of 1/1/2021	21,761,352
3 Benefit payments	(113,687,442)
4 Interest on (1), (2), and (3) at 7.50%	91,779,615
5 Expected actuarial liability as of 1/1/2022 Before Changes	1,257,636,459
6 Change in Actuarial Accrued Liability due to Change in Assumptions	12,315,234
7 Expected actuarial liability as of 1/1/2022	1,269,951,693
8 Actual actuarial liability as of 1/1/2022	1,279,847,074
9 Gain (loss) due to liabilities: (7) - (8)	(9,895,381)
C. Total actuarial gain (loss): A + B	27,045,205

<sup>6</sup>Actuarial value of assets set equal to market value of assets less expense & contingency reserve on January 1, 2022 resulting in a significant gain on assets.

<sup>7</sup>Liability gain (loss) analyzed on Entry Age Normal basis.

# Section 1 (continued)

## 1.4 Actuarial Balance Sheet as of January 1, 2022

### Actuarial Assets

Actuarial value of present assets	\$ 943,201,853
Actuarial present value of future participant contributions	137,869,247
Actuarial present value of future employer contributions	328,250,874
Total present and future assets	<u>\$ 1,409,321,974</u>

### Actuarial Liabilities

Actuarial present value of benefits now payable	\$ 882,739,729
Actuarial present value of benefits payable in the future:	
Active participants	\$ 468,600,536
Terminated vested participants	42,230,323
Terminated nonvested participants	<u>15,751,386</u>
Total payable in the future	<u>526,582,245</u>
Total liabilities for benefits	\$ 1,409,321,974
Surplus / (deficit)	0



## Section 1 (continued)

### 1.5 Prioritized Solvency Test

Valuation Date January 1	Active Participants' Accumulated Contributions	Retirees, Beneficiaries and Inactive Participants	Active Participants (employer-financed)	Actuarial Value of Assets	Percent of Present Value Covered by Valuation Assets		
	(1)	(2)	(3)		(1)	(2)	(3)
1999	130,705,014	276,290,128	303,953,494	694,250,672	100%	100%	95%
2000	129,398,364	353,852,977	288,213,016	770,090,498	100%	100%	100%
2001	127,086,325	414,052,293	269,590,438	828,097,298	100%	100%	100%
2002	116,506,785	476,104,516	372,221,726	861,128,076	100%	100%	72%
2003	115,570,837	492,633,382	361,818,972	873,260,102	100%	100%	73%
2004	106,021,476	528,287,121	364,459,284	901,996,455	100%	100%	73%
2005	89,710,662	518,880,414	368,306,240	935,328,638	100%	100%	89%
2006	90,001,111	661,353,685	319,920,373	983,828,243	100%	100%	73%
2007	96,223,413	712,467,372	305,409,824	1,003,428,983	100%	100%	64%
2008	98,112,123	781,006,957	249,244,208	1,014,923,381	100%	100%	54%
2009	104,576,264	801,995,237	187,035,147	963,851,408	100%	100%	31%
2010	110,054,510	805,831,292	195,185,151	950,709,944	100%	100%	18%
2011	103,178,297	842,643,351	169,510,764	944,356,735	100%	100%	0%
2012	116,268,566	850,498,527	189,084,439	925,389,359	100%	95%	0%
2013	120,355,959	849,412,565	190,553,739	914,494,335	100%	93%	0%
2014	114,092,991	896,477,122	164,014,835	922,922,386	100%	90%	0%
2015	116,755,946	892,626,625	156,682,397	926,905,797	100%	91%	0%
2016	120,507,482	887,757,927	157,501,063	915,391,079	100%	90%	0%
2017	122,746,557	933,916,821	166,666,305	901,076,683	100%	83%	0%
2018	122,241,799	935,005,411	178,661,824	899,816,911	100%	83%	0%
2019	126,636,422	932,068,226	179,448,673	886,156,011	100%	81%	0%
2020	130,619,480	934,865,605	176,132,159	888,759,194	100%	81%	0%
2021	135,068,312	928,763,007	157,461,633	894,251,149	100%	82%	0%
2022 <sup>8</sup>	137,779,168	940,721,438	201,346,468	943,201,853	100%	86%	0%

<sup>8</sup>Prioritized Solvency Test reflects Entry Age Normal effective January 1, 2022. Years prior to 2022 used Projected Unit Credit.

## Section 2 - Valuation of the System's Assets

This section of the report shows the development of the actuarial value of the assets of the System and provides information regarding the expense and contingency reserve, investment results and the various assets of the System.

The amount of assets used in the actuarial valuation is known as the "actuarial value of assets." The method is discussed in the summary of methods and assumptions, section 3.8. The development of the actuarial value of assets is shown in section 2.1. An important element in the development of the actuarial value of assets is the expense and contingency reserve. The amount of the reserve is determined pursuant to a policy adopted by the Board of Trustees. The history of the reserve is presented in section 2.2.

As shown in section 2.3, the fund had a rate of return of 11.76% on an actuarial value basis, which is 4.26% above the assumed rate of return of 7.50% for plan year 2021. The rate of return on an actuarial value basis is intended to be a more stable rate of return and fluctuate less than rates of return on a market value basis. The rate of return on an actuarial basis is not always a fair measure of the annual investment performance of the fund. Another indicator of actual performance during the year is the rate of return on a market value basis which was 12.51% for plan year 2021, also presented in section 2.3.

## Section 2 (continued)

### 2.1 Development of the Actuarial Value of Assets

A.	Market Value of Assets (MVA) on January 1, 2021	\$914,776,954
B.	Member contributions	20,880,189
C.	Employer contributions	41,226,981
D.	Benefits paid	(113,687,442)
E.	Administrative Expenses	(1,523,071)
F.	Investment return (net of investment expenses only)	111,154,045
G.	Market Value of Assets on January 1, 2022	972,827,656
H.	Expense and Contingency Reserve as of January 1, 2022	29,625,803
I.	MVA on January 1, 2022 minus Expense & Contingency Reserve (G. - H.)	943,201,853
J.	Yield for the 2021 plan year based upon Market Value of Assets	12.51%
K.	Expected Return on Assets	N/A
L.	Gain/(Loss)	
(a)	2021	N/A
(b)	2020	N/A
(c)	2019	N/A
(d)	2018	N/A
(e)	2017	N/A
M.	Amount to be Recognized	
(a)	2021	N/A
(b)	2020	N/A
(c)	2019	N/A
(d)	2018	N/A
(e)	2017	N/A
N.	Amount not Recognized	
(a)	2021 (Ma x 4/5)	N/A
(b)	2020 (Mb x 3/5)	N/A
(c)	2019 (Mc x 2/5)	N/A
(d)	2018 (Md x 1/5)	N/A
(e)	2017 (Me x 0/5)	N/A
(f)	Total	\$0
O.	Actuarial Value of Assets at January 1, 2022, (I) - (Nf)	943,201,853
P.	Minimum Corridor of Actuarial Value of Assets (80% x I.)	754,561,482
Q.	Maximum Corridor of Actuarial Value of Assets (120% x I.)	1,131,842,224
R.	Actuarial Value of Assets at January 1, 2022 adjusted for limits <sup>9</sup>	943,201,853
S.	Yield for the 2021 plan year based upon the Actuarial Value of Assets	11.76%

<sup>9</sup>Actuarial Value of Assets set equal to Market Value of Assets less expense and contingency reserve as of January 1, 2022.

## Section 2 (continued)

### 2.2 The Expense and Contingency Reserve

Effective January 1, 1996, the Board of Trustees revised Rule X, which governs the determination of the amount of the expense and contingency reserve. The expense portion of the reserve is the sum of:

1. The estimated annual operating expenses for the ensuing year;
2. An amount equal to the liability for non-insurance supplements;
3. An amount equal to the liability for insurance supplements for those participants participating in the program on January 1; and
4. The estimated amount of insurance supplements to be paid for participants expected to retire and participate in the program during the ensuing year.

The investment contingency portion of the reserve was established to help cover significant shortfalls in the actuarial rate of return. However, the entire contingency reserve was released in 2009.

Below is a history of the expense and contingency reserve:

January 1	Expense Reserve	Investment Contingency Reserve	Total Expense and Contingency Reserve
1998	\$ 30,891,555	\$ 24,100,041	\$ 54,991,596
1999	22,142,759	45,972,067	68,114,826
2000	27,992,032	50,003,862	77,995,894
2001	29,837,776	50,003,743	79,841,519
2002	23,527,529	50,003,743	73,531,272
2003	24,952,255	37,759,976	62,712,231
2004	26,028,780	37,759,976	63,788,756
2005	27,170,188	45,115,876	72,286,064
2006	32,534,770	45,115,876	77,650,646
2007	29,864,976	50,732,410	80,597,386
2008	31,987,370	57,234,574	89,221,944
2009	30,555,388	0	30,555,388
2010	29,903,107	0	29,903,107
2011	29,480,465	0	29,480,465
2012	29,564,563	0	29,564,563
2013	29,181,897	0	29,181,897
2014	30,439,781	0	30,439,781
2015	29,868,370	0	29,868,370
2016	29,537,454	0	29,537,454
2017	30,921,897	0	30,921,897
2018	30,751,247	0	30,751,247
2019	30,776,068	0	30,776,068
2020	30,244,590	0	30,244,590
2021	30,004,728	0	30,004,728
2022	29,625,803	0	29,625,803

## Section 2 (continued)

### 2.3 Investment Performance

There are several different methods of approximating the rates of return on investments of the trust fund. Following is a brief comparison of the actuarial assumed rate of return as compared with rates of return on market and actuarial value bases:

#### a. Market Value Basis

The rate of return on a market value basis is the ratio of the appreciation (or depreciation) of assets less contributions plus disbursements to the market value at the beginning of the year plus the average of the receipts and disbursements made during the year. This may be approximated as follows:

i.	A = Market value of assets as of January 1, 2021	\$	914,776,954
ii.	B = Market value of assets as of January 1, 2022		972,827,656
iii.	C = Contributions during the period		62,107,170
iv.	D = Distributions during the period		115,210,513
v.	Rate of return:		
			$\frac{B - A + D - C}{A + 0.5 * (C - D)}$
			12.51%
vi.	Actuarial assumed rate of return for 2021		7.50%
vii.	Difference between actual and assumed rates of return (v) - (vi)		5.01%

#### b. Actuarial Value Basis

The rate of return on an actuarial value basis is approximated using the same method:

i.	A = Actuarial value of assets as of January 1, 2021	\$	894,251,149
ii.	B = Actuarial value of assets as of January 1, 2022		943,201,853
iii.	C = Contributions during the period		62,107,170
iv.	D = Distributions during the period		115,210,513
v.	Rate of return:		
			$\frac{B - A + D - C}{A + 0.5 * (C - D)}$
			11.76%
vi.	Actuarial assumed rate of return for 2021		7.50%
vii.	Difference between actual and assumed rates of return (v) - (vi)		4.26%

## Section 2 (continued)

### 2.4 Summary of Investment Yield Performance

January 1	Market Value of Assets (MVA)	Actuarial Value of Assets (AVA)	MVA Rate of Return	AVA Rate of Return
2017	\$ 850,180,422	\$ 901,076,683	5.31%	5.51%
2018	914,082,259	899,816,911	15.22%	6.85%
2019	819,449,893	886,156,011	-4.69%	4.50%
2020	893,295,602	888,759,194	16.10%	6.56%
2021	914,776,954	894,251,149	8.85%	7.04%
2022	972,827,656	943,201,853	12.51%	11.76%

## Section 3 - Basis of the Valuation

In this section, the basis of the valuation is presented and described. This information – the provisions of the System and the census of members – is the foundation of the valuation, since these are the present facts upon which benefit payments will depend.

The effects of administering the System's plan provisions have a direct impact on actuarial costs. The System uses the entry age normal actuarial cost method calculated on page 8 for actuarial funding and actuarial financial reporting purposes.

A summary of the System's provisions is provided in Section 3.1, the legislative history of the System is provided in Section 3.2, and member census information is shown in Section 3.3 to Section 3.7.

The valuation is based upon the premise that the System will continue in existence, so that future events must also be considered. These future events are assumed to occur in accordance with the actuarial assumptions and concern such events as the earnings of the fund; the number of members who will retire, die or terminate their services; their ages at such termination and their expected benefits.

The actuarial assumptions and the actuarial cost method, or funding method, which have been adopted to guide the sponsor in funding the System in a reasonable and acceptable manner, are described in Section 3.8.

A guide to actuarial terminology used in this report is included as Section 3.9.

## Section 3 (continued)

### 3.1 Summary of Plan Provisions

#### Participants

All persons regularly employed by the board of education, charter schools, and members of the board of trustees are in the System.

#### Retirement age

Normal

Age 65 or any age if age plus the years of credited service equals or exceeds 80 (Rule of 80).

Early

Age 60 with 5 years of service

#### Service retirement allowance

- a. 2.00% (1.25% if terminated prior to July 1, 1999 or 1.75% if hired on or after January 1, 2018) times years of credited service, subject to a maximum of 60%
- b. Times average final compensation (AFC)
- c. Subject to a maximum of 60% of AFC.
  - i. AFC is the highest average compensation for any three consecutive years of the last 10 years of service.
  - ii. Compensation is the regular wages plus what the employer pays towards the participant's health and welfare benefits.
  - iii. Minimum monthly benefit is \$10.00 for each year of credited service, up to 15 years, retirement age 65 and over.
  - iv. Unused sick leave is added to a participant's credited service and age.

#### Early retirement benefit

Service retirement allowance reduced five-ninths of one percent for each month of commencement prior to age 65 or the age at which the Rule of 80 (Rule of 85 if terminated prior to August 28, 2017) would have been satisfied had the member continued working until that age, if earlier.

#### Disability benefit

Service retirement allowance using actual service, or 25% of AFC if larger, provided that in no case will the benefit exceed that payable if service had continued to age 65.

- a. Disability must be incurred while a member as determined by the medical board and approved by the board of trustees.
- b. The participant must have a minimum of five years of credited service and not be eligible for normal retirement.

Continued disability is subject to routine verification.

#### Withdrawal benefit

Accumulated contributions of participant with interest credited to the participant's account.



## Section 3 (continued)

### 3.1 Summary of Plan Provisions

#### Vested benefit

Full vesting on termination of employment after at least five years of service is provided if contributions are left with the System. The full accrued benefit is payable at age 65 or a reduced early retirement benefit prior to age 65.

#### Retirement options

In lieu of the benefit paid only over the lifetime of the participant, a reduced benefit payable for life of participant with:

- Option 1 Same retirement allowance continued after death to the beneficiary.
- Option 2 One-half of the retirement allowance continued after death to the beneficiary.
- Option 3 Same retirement allowance continued after death to the beneficiary. If the beneficiary predeceases the participant, the retirement allowance is adjusted back to the unreduced allowance.
- Option 4 One-half of retirement allowance continued after death to the beneficiary. If the beneficiary predeceases the participant, the retirement allowance is adjusted back to the unreduced allowance.
- Option 5 Increased retirement allowance is provided up to age 62, such that benefit provided prior to age 62 is approximately equal to the sum of the reduced retirement allowance paid after age 62 and Social Security.
- Option 6 Options 1 and 5 combined.
- Option 7 Options 2 and 5 combined.

#### Survivor benefits

If an active participant dies after completing 18 months of service, leaving a surviving spouse or other dependent beneficiaries, survivor benefits are payable. The widow or dependent beneficiary may elect to receive either a refund of accumulated contributions, or:

- a. A survivor who is the widow at least age 62 and married to a participant for at least one year receives \$60 per month.
- b. A widow with dependent, unmarried children under age 22 receives \$60 per month plus \$60 per dependent child, not to exceed \$180 per month. The benefit ceases when youngest child is age 22 and resumes again under (a) at age 62.
- c. If no benefits are payable under (a) or (b), minor children may receive a benefit of \$60 per child or \$180 divided among them if more than three children.
- d. If no benefits are payable under (a), (b) or (c), a dependent parent or parents may receive or share \$60 per month upon attaining age 62.

If an active participant dies after completing 5 years of service, the widow or dependent beneficiary may elect to receive either a refund of accumulated contributions or:

- a. If the survivor is the widow, a survivor benefit calculated as if the participant had been age 60 at death and elected Option 1, plus \$60 per dependent child not to exceed \$180 per month.
- b. If there is no widow, a survivor benefit calculated as if the participant had been age 60 at death and elected Option 1.

## Section 3 (continued)

### 3.1 Summary of Plan Provisions

#### Return of contributions upon death

If after the death of a participant, no further monthly benefits are payable to a beneficiary under an optional form of payment, or under the survivor benefit provisions, the participant's beneficiary shall be paid the excess, if any, of the participant's accumulated contributions over all payments made to or on behalf of the deceased participant.

#### DROP

Effective July 1, 2001, active participants may elect to enter the deferred retirement option plan (DROP) for up to four years. Upon entering the DROP, the participant's retirement benefit is frozen and credited to the participant's DROP account. At the end of the DROP, or upon earlier termination of employment, the DROP account is paid in a lump sum or installments, at the participant's option. During the DROP, the participant continues as an active participant, but does not pay contributions. To enter the DROP the participant must be age 65 or meet the Rule of 85. The DROP program is no longer available, ending June 30, 2008.

#### Contributions by participants

Participants hired before January 1, 2018 contribute 5.50% of compensation in 2018. This rate increases 0.50% per year until it reaches 9.00%. After this, the contribution rate will remain at 9.00% of compensation.

Participants hired on or after January 1, 2018 contribute 9.00% of compensation.

Accumulated contributions are credited at the rate of interest established by the board of trustees. The current crediting rate is 5% per year.

#### Contributions by employers

The employer contribution rate will be set at a flat 16.00% of covered payroll for Plan year 2018. This contribution rate shall be decreased by 0.50% in each subsequent Plan year until reaching 9.00% of covered payroll. After this, the employer contribution rate will remain at 9.00% of covered payroll.

#### Expenses

Administrative expenses are paid out of investment income.

#### Changes in Provisions from Prior Valuation

None.

## Section 3 (continued)

### 3.2 Legislative History of the Retirement System

On and after January 1, 1944, all persons employed by the board of education on a full-time permanent basis are participants of the System as a condition of employment. In 1961, provisions regarding benefits and member contribution levels were revised for all future members of the board of education. Participants of the System at that time were granted the right to remain under the "old plan" and have their membership governed by the provisions of the law in effect prior to 1961. These old plan participants have both benefits and contributions based on a \$3,000 maximum annual compensation. Old plan participants have been given the option to transfer into the revised plan at various times since 1961.

Effective October 13, 1969, legislation permitted the reinstatement of credited service lost during the years 1944 to 1947 inclusive when the married women teachers rule was in effect.

Effective August 31, 1972, legislation resulted in the following changes:

- Purchase of past service credit by paying contributions for service claimed plus interest.
- Service as extended substitute teacher.
- Service of re-employed participants lost on prior terminations.
- Service out-state Missouri and outside the state of Missouri.
- Service lost by those who elected to stay out of the retirement plan either temporarily or to date.
- Old plan participants who wished to become new plan participants could do so by paying the differential in participant contributions under the new and old plans, plus interest.
- Dependent beneficiary on death of participant before retirement but after age 60 or age 55 with 30 years service may receive option 1 benefit as if participant had retired under such option.
- A participant with five or more years of service and prior to age 65 may be retired with a disability benefit if the medical board certifies that such participant is mentally or physically totally incapacitated for further performance of duty.
- Minimum retirement benefit at age 65 or after 10 years service is \$50.00 per month.

On February 10, 1975, the Missouri Supreme Court handed down a decision supporting HB 613 (Section 169.585 of state statutes), which granted increased benefits to retired teachers. The increases apply to those teachers who retired after June 30, 1957, and prior to January 1, 1971. Technically, those retirees are retained as "advisors and supervisor" and receive a "salary" of \$5 per month for each year of service, with a maximum of \$75. This salary plus the regular retirement benefit cannot exceed \$150 per month. To the extent that assets are depleted because of this law, future district contributions will increase. Because these benefits are paid as "salaries," coming out of investment income along with other expenses of operation, there will be less money available for crediting of interest to the various funds at the end of the year.

## Section 3 (continued)

### 3.2 Legislative History of the Retirement System

Effective August 13, 1978 legislation resulted in the following changes:

- The service retirement allowance and projected service retirement allowance was changed to 1-1/4% of average final compensation per year of credited service. The participant's allowance plus his Social Security primary insurance amount could not exceed 80% of his average final compensation. Participants born before 1917 receive the larger of the allowances calculated under the new formula and the formula in effect immediately before it.
- Credited service no longer limited to a maximum of 35 years.
- Two new joint and survivor optional forms of payment were added which provide for the participant's pension to be adjusted back to his unreduced pension in the event his spouse predeceases him.
- Contributions from participants shall be 3% of compensation.
- End of period for purchasing prior service or outside service extended from December 31, 1973 to December 31, 1980. Deleted requirement of electing to purchase out-state or outside the state of Missouri service within one year of completing five years of credited service.
- Gives board of trustees the power to establish regulations, methods and factors that may be needed to calculate primary Social Security benefits.
- Dependent beneficiary on death of participant before retirement with five or more years of credited service may receive option 1 benefit as if the participant had retired under that option as of the date of his death.
- Allow retired educational secretaries to serve as part-time or temporary substitute educational secretary up to a maximum of 360 hours per school year without a reduction in the retired member's retirement allowance or requiring the retired members to contribute to the retirement system.

Effective September 28, 1979, legislation resulted in the following changes:

- Accumulated and unused days of sick leave shall be included in computing a participant's age and credited service at retirement.
- Participants who have attained age 62 and who have 30 or more years of credited service may retire and receive a service retirement allowance without reduction for early retirement. The early retirement reduction for participants who retire with 30 or more years of credited service but who have not attained age 62 on their retirement date shall be determined on the basis of the number of months by which their age at retirement is less than age 62.
- Benefits to survivors of a participant who dies while a member and after having at least 18 months of credited service are as follows:
  - (a) Surviving spouse age 62 or over: \$60 per month.
  - (b) Surviving spouse with unmarried dependent children under age 22: \$60 per month, plus \$30 per month for each eligible child, with a maximum of \$150 per month.
  - (c) Unmarried dependent children under age 22: \$60 per month for each eligible child, with a maximum of \$120 per month. This benefit is payable if the benefit in (b) is not payable.
  - (d) Dependent parent(s): \$60 per month, provided no benefits are payable under (a), (b) or (c) above.

## Section 3 (continued)

### 3.2 Legislative History of the Retirement System

Effective September 28, 1981, legislation resulted in the following changes:

- The provision limiting service retirement and projected service retirement allowances to 80% of average final compensation less Social Security was removed for future retirees.
- The minimum monthly benefit payable to participants retiring on or after age 65 with 10 or more years of service was increased to \$75.
- Old plan participants were extended the option to transfer into the current System by paying the difference in participant contributions plus interest. Such election to be made on or before December 31, 1984. Retired participants who retired prior to January 1, 1955, may be consultants at a "salary" equal to \$4 for each year of retirement prior to January 1, 1982. Total "salaries" as a "school consultant" and "special school advisor and supervisor" are limited to \$250 per month.
- The retirement system may contribute as part of its administrative expenses toward health, life and similar insurance for retirees.
- The actuarial cost method was changed from the "entry age cost method" to the "frozen entry age cost method." The period for amortizing "supplements" to the unfunded actuarial accrued liability was set at 50 years from the time the "supplement" is created.
- Several changes were made dealing with the administration and operation of the System.
- Investment powers were broadened.

Effective September 28, 1984, legislation resulted in the following changes:

- Dependent beneficiary on death of employed, active participant before retirement with five or more years of service may receive option 1 benefit as if the participant had attained age 55 (if less than 55 at his death) and had retired under option 1 as of the date of his death.
- In addition to the option 1 death benefit, a surviving spouse may receive \$30 per month for each unmarried dependent child, provided that the total benefit does not exceed the greater of \$150 or the option 1 benefit.
- Surviving spouse benefits do not cease on remarriage.
- Dependent children's benefits do not require that the child remain a full-time student.
- Participants retired on disability may elect to receive an actuarial equivalent benefit under options 1 through 4.
- Retired participants who retired on or after January 1, 1976, may be employed as school consultants and receive a salary and insurance benefits provided other retirants.

## Section 3 (continued)

### 3.2 Legislative History of the Retirement System

Effective August 13, 1986, legislation resulted in the following changes:

- A participant with 30 years of credited service who is between the ages of 55 and 62, upon certification by the board of education, is eligible for a supplemental early retirement benefit payable to age 62. This provision remains in effect until December 31, 1991.
- Benefits to a surviving spouse for dependent children are increased from \$30 to \$60 per month, with a maximum of \$240 per month, including the \$60 for the surviving spouse.
- Supplemental pay to retired participants employed as "school consultants" is increased by \$2 per month for each year between the participant's date of retirement and December 31, 1986

Effective June 19, 1987, legislation resulted in the following changes:

- Reinstated the option for "old plan" participants to elect "new plan" membership by paying the difference in contributions accumulated with interest.
- Increased the minimum benefit for participants retiring on or after age 65 to \$10 per month for each year of credited service, up to a maximum of 15 years.
- Several changes were made dealing with the accounting, administration, and operation of the System.

Effective August 13, 1988, legislation resulted in the following changes:

- Made provisions for children's benefits uniform, providing \$60 per month per child, up to a maximum of \$180 per month, under both subsections 169.460(13) and (15) survivor benefits.
- Supplemental pay to retired participants of \$2 per month for each year of retirement up to December 31, 1988.

Effective June 14, 1989, legislation resulted in the following changes:

- The maximum on compensation was removed.
- Average final compensation is based on the highest three consecutive years, rather than the highest five consecutive years.
- Participants may retire with unreduced benefits at any age, if their age plus credited service equals or exceeds 85 (the "Rule of 85").

Effective May 31, 1990, legislation resulted in the following change:

- Supplemental pay of \$2 per month for each year of retirement up to December 31, 1990.

Effective August 28, 1993, legislation resulted in the following change:

- Supplemental pay of \$3 per month for each year of retirement up to December 31, 1993.

## Section 3 (continued)

### 3.2 Legislative History of the Retirement System

Effective August 28, 1996, legislation resulted in the following changes:

- Provision was added for the purchase of service for certain periods of layoff.
- The investment trustee position was eliminated and the position of school administrator trustee was added.
- Cost-of-living increases for participants who retired prior to August 28, 1996, with at least 15 years of credited service. The cost-of-living increases are up to 3% in one year, with a cumulative maximum of 10%.
- The board of education is authorized to increase retirement benefits and the participant contribution rate, subject to several conditions.

Effective August 28, 1997, legislation resulted in the following change:

- Cost-of-living increases extended to participants who retired prior to August 28, 1997, with at least 15 years of credited service. The cost-of-living increases are up to 3% in one year, with a cumulative maximum of 10%.

In accordance with the statutory authority granted the board of education in 1996, the board of education made the following changes:

- Participant contributions were increased to 4.5%, effective July 1, 1998; to 5.0%, effective July 1, 1999; and, if necessary to 5.5%, effective July 1, 2000.
- The service retirement allowance was changed to 2.00% of average final compensation per year of credited service, subject to a maximum of 60% of average final compensation, effective for participants who retired after June 29, 1999.
- A “catch-up” cost-of-living adjustment (COLA) is provided for participants who retired prior to June 30, 1999, and survivors of participants who retired or died prior to June 30, 1999. The amount of the “catch-up” COLA is equal to 65% of the amount by which the participant’s original benefit would have increased due to increases in the CPI, in excess of any supplements or COLA increases being received by the participant. The “catch-up” COLA is effective July 1, 2000.
- The board of education agreed to contribute 8.03% of covered payroll for 1998, 1999, and 2000, in order to fund the benefit increase and the “catch-up” COLA.

In accordance with the statutory authority granted the board of education in 1996, the board of education made the following changes:

- Effective January 1, 2001, all participants who retired prior to January 1, 2000, received a 3% cost-of-living increase.
- Effective July 1, 2001, a DROP was made available until June 30, 2005, at which time the program will be evaluated to determine whether or not it should be extended. Eligible participants may elect to enter the DROP for up to four years.
- In conjunction with the DROP, employers will contribute at 8.00% of covered payroll for 2001. The contribution rate for subsequent years will be based on the rate determined by the actuarial valuation for the January 1 of the year preceding the year the contribution is due.

## Section 3 (continued)

### 3.2 Legislative History of the Retirement System

Effective August 28, 2002, legislation resulted in the following changes:

- Purchase of service rules were updated.
- The System may accept qualified transfers of funds for the purchase of service.
- Clarified provisions relating to charter school participation in the System.
- Option 5, the level income option is added.
- Replaced the specific actuarial cost method in the statutes with a provision that the method adopted by the board of trustees may be any method in accordance with generally accepted actuarial standards. The amortization period for the UAAL may not exceed 30 years.

Effective August 28, 2017, legislation resulted in the following changes:

- Replaced the normal pension eligibility requirement where a member's age plus credited service equals not less than eighty-five (the "Rule of 85") with not less than eighty (the "Rule of 80").
- For members hired for the first time on or after January 1, 2018, the multiplier in the annual pension benefit formula (credited service x pension multiplier x average final compensation) was reduced from two percent (2%) to one and three-fourths percent (1.75%).
- Beginning January 1, 2018, the member contribution rate of five percent (5%) of compensation shall increase by one-half of one percent (0.5%) annually until such time as the percentage equals nine percent (9%).
- For member's hired for the first time on or after January 1, 2018, the member contribution rate shall be nine percent (9%) of compensation.
- For calendar year 2018, the actuarially determined annual employer contribution rate shall be replaced with sixteen percent (16%) of total member compensation for each employer which, for each calendar year thereafter, shall decrease by one-half of one percent (0.5%) until calendar year 2032, when the annual employer contribution rate shall equal nine percent (9%) of total member compensation for each employer for that year and all subsequent years.



## Section 3 (continued)

### 3.3 Changes in System Participation

	Active	Retirees	Beneficiaries	Disabled	Total In Pay Status	Deferred Vested	Nonvested with Balance	Total Terminated Records	Total
Total as of January 1, 2021	<b>4,984</b>	3,893	268	225	<b>4,386</b>	703	2,857	<b>3,560</b>	12,930
New Entrants	<b>894</b>								894
Rehires/Transfers	<b>46</b>	0				(10)	(36)	<b>(46)</b>	0
Retirements	<b>(126)</b>	144		(1)	<b>143</b>	(14)	(3)	<b>(17)</b>	0
Disabilities	<b>(4)</b>			4	<b>4</b>	0			0
New Beneficiaries			15		<b>15</b>				15
Deaths	<b>(1)</b>	(165)	(17)	(9)	<b>(191)</b>	0	0		(192)
Deferred Vested	<b>(251)</b>					251		<b>251</b>	0
Nonvested Terminations - Account Balance	<b>(597)</b>					0	597	<b>597</b>	0
Refunds Paid in 2021	<b>(334)</b>					(14)	(92)	<b>(106)</b>	(440)
Nonvested Termination	<b>(16)</b>					0			(16)
Data Adjustments	<b>(1)</b>	7	(1)		<b>6</b>	24	(7)	<b>17</b>	22
Total as of January 1, 2022	<b>4,594</b>	3,879	265	219	<b>4,363</b>	940	3,316	<b>4,256</b>	13,213

## Section 3 (continued)

### 3.4 Member Census Information

As of January 1	2022	2021
<b>Active Members</b>		
Number	4,594	4,984
Average Age	43.78	43.49
Average Service	8.11	8.15
Average Covered Payroll	\$ 56,474	\$ 53,105
<b>Vested Terminated Members</b>		
Number	940	703
Average Account Balance	\$ 35,941	\$ 34,896
<b>Non-vested Terminated Members</b>		
Number	3,316	2,857
Average Account Balance	\$ 4,750	\$ 4,535
<b>Benefit Recipients</b>		
Number	4,363	4,386
Average Age	75.14	74.95
Average Monthly Benefit	\$ 2,012	\$ 2,005

## Section 3 (continued)

### 3.5 Distributions of Active Members

#### Years of Service By Age Charter Schools

Age	Years of Service									Total
	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40+	
Under 25	103	0	0	0	0	0	0	0	0	103
25 - 29	294	25	0	0	0	0	0	0	0	319
30 - 34	247	102	10	0	0	0	0	0	0	359
35 - 39	130	72	22	6	0	0	0	0	0	230
40 - 44	124	47	22	8	3	0	0	0	0	204
45 - 49	91	27	16	9	7	0	0	0	0	150
50 - 54	76	31	13	6	3	1	0	0	0	130
55 - 59	46	25	9	4	0	1	1	0	0	86
60 - 64	37	17	12	4	1	0	0	0	0	71
65 - 69	15	8	4	3	0	0	0	0	0	30
70 & Up	1	0	1	0	0	0	0	0	0	2
<b>Total</b>	<b>1,164</b>	<b>354</b>	<b>109</b>	<b>40</b>	<b>14</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1,684</b>

#### Years of Service By Age School District

Age	Years of Service									Total
	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40+	
Under 25	89	0	0	0	0	0	0	0	0	89
25 - 29	283	18	0	0	0	0	0	0	0	301
30 - 34	208	112	8	0	0	0	0	0	0	328
35 - 39	130	88	38	8	0	0	0	0	0	264
40 - 44	130	91	47	38	15	0	0	0	0	321
45 - 49	101	73	43	53	79	8	0	0	0	357
50 - 54	106	71	42	44	73	29	1	0	0	366
55 - 59	73	82	57	45	52	20	14	1	0	344
60 - 64	74	67	48	35	35	21	25	14	4	323
65 - 69	30	42	17	10	15	11	3	6	8	142
70 & Up	10	14	8	7	10	7	3	4	5	68
<b>Total</b>	<b>1,234</b>	<b>658</b>	<b>308</b>	<b>240</b>	<b>279</b>	<b>96</b>	<b>46</b>	<b>25</b>	<b>17</b>	<b>2,903</b>

## Section 3 (continued)

### 3.5 Distributions of Active Members

#### Years of Service By Age

#### Total

Age	Years of Service									Total	
	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40+		
Under 25	192	0	0	0	0	0	0	0	0	0	192
25 - 29	577	43	0	0	0	0	0	0	0	0	620
30 - 34	455	214	18	0	0	0	0	0	0	0	687
35 - 39	260	160	60	14	0	0	0	0	0	0	494
40 - 44	254	138	69	46	18	0	0	0	0	0	525
45 - 49	192	100	59	62	86	8	0	0	0	0	507
50 - 54	183	102	55	50	76	30	1	0	0	0	497
55 - 59	120	107	66	50	52	21	15	1	0	0	432
60 - 64	112	86	61	39	36	21	25	14	4	0	398
65 - 69	45	50	21	13	15	11	3	6	8	0	172
70 & Up	11	14	9	7	10	7	3	4	5	0	70
<b>Total</b>	<b>2,401</b>	<b>1,014</b>	<b>418</b>	<b>281</b>	<b>293</b>	<b>98</b>	<b>47</b>	<b>25</b>	<b>17</b>	<b>0</b>	<b>4,594</b>

## Section 3 (continued)

### 3.6 Distributions of Inactive Members

#### Deferred Vested and Nonvested

Account Balance	Vested	Non-Vested	Total
0 - 1,000	0	649	649
1,000 - 5,000	0	1,486	1,486
5,000 - 10,000	8	781	789
10,000 - 25,000	379	389	768
25,000 - 50,000	368	9	377
50,000 - 75,000	116	2	118
75,000 - 100,000	48	0	48
100,000+	21	0	21
<b>Total</b>	<b>940</b>	<b>3,316</b>	<b>4,256</b>

#### Retirees, Beneficiaries and Disabled

Option	Service Benefit	Disability Benefit	Survivor Benefit	All
0	3,275	174	265	3,714
1	128	13	0	141
2	76	5	0	81
3	187	15	0	202
4	176	6	0	182
5	21	1	0	22
6	13	5	0	18
7	3	0	0	3
<b>Total</b>	<b>3,879</b>	<b>219</b>	<b>265</b>	<b>4,363</b>

#### Annual Benefit

Option	Service Benefit	Disability Benefit	Survivor Benefit	All
0	\$ 84,822,890	\$ 2,639,049	\$ 3,311,667	\$ 90,773,606
1	2,327,632	170,481	0	2,498,113
2	1,947,908	117,333	0	2,065,241
3	4,057,623	231,707	0	4,289,330
4	4,674,694	136,665	0	4,811,359
5	515,984	9,911	0	525,895
6	249,439	48,317	0	297,756
7	72,357	0	0	72,357
<b>Total</b>	<b>\$ 98,668,527</b>	<b>\$ 3,353,463</b>	<b>\$ 3,311,667</b>	<b>\$ 105,333,657</b>

## Section 3 (continued)

### 3.7 Schedule of Retirees and Beneficiaries Added/Removed From Rolls

Plan Year	<u>Added to Payroll</u>		<u>Removed from Payroll</u>		<u>Payroll Year-End</u>		% Increase in Annual Allowances	Average Annual Allowance
	No.	Annual Allowances	No.	Annual Allowances	No.	Annual Allowances		
2009	N/A		N/A		N/A		N/A	N/A
2010	N/A		N/A		4,370		N/A	N/A
2011	373		156		4,587	\$98,927,501	N/A	\$21,567
2012	135	\$2,606,505	182	\$2,793,752	4,540	\$98,768,933	-0.16%	\$21,755
2013	164	\$3,544,756	188	\$2,699,920	4,516	\$99,629,314	0.87%	\$22,061
2014	313	\$7,711,256	140	\$2,288,004	4,689	\$105,061,832	5.45%	\$22,406
2015	163	\$3,774,578	228	\$3,783,237	4,624	\$105,066,268	0.00%	\$22,722
2016	151	\$3,279,162	188	\$3,058,449	4,587	\$105,295,884	0.22%	\$22,955
2017	145	\$3,114,108	171	\$2,978,925	4,561	\$105,434,220	0.13%	\$23,116
2018	158	\$4,044,180	193	\$3,526,969	4,526	\$105,976,561	0.51%	\$23,415
2019	162	\$3,400,180	188	\$3,450,225	4,500	\$105,995,116	0.02%	\$23,554
2020	161	\$3,739,591	184	\$2,728,795	4,477	\$106,259,608	0.25%	\$23,735
2021	143	\$3,675,006	234	\$4,350,523	4,386	\$105,502,094	-0.71%	\$24,054
2022	168	\$3,679,768	191	\$3,788,412	4,363	\$105,333,657	-0.16%	\$24,142

## Section 3 (continued)

### 3.8 Summary of Methods and Assumptions

The following assumptions and methods were selected by the Board and used in this analysis. The plan's actuaries perform an experience study every 5 years and discuss anticipated future trends with the Public School Retirement System of the City of St. Louis, Missouri to ensure appropriate and reasonable assumptions and methods for the purpose of the measurement. The last experience study was completed in December 2021.

#### Interest

7.00% per annum, which includes a 2.50% allowance for inflation; 7.00% is net of investment expenses.

#### Participant account interest crediting rate

5.0% per annum.

#### Expenses

The rate of investment return assumed is net of investment expenses.

#### Mortality – Healthy Lives

PubG-2010 (Below Median) Mortality Table, amount weighted, projected fully generationally using projection scale MP-2021. The mortality assumption for retired participants receiving benefits is increased by 2% for males and 10% for females.

#### Beneficiary Mortality

PubG-2010 (Below Median) Mortality Table, amount weighted, projected fully generationally using projection scale MP-2021.

#### Disability Mortality

PubT/G-2010 Mortality Disability Table, amount weighted, projected fully generationally using projection scale MP-2021.

#### Withdrawal

Withdrawals are assumed to occur at rates based on actual experience of the retirement system. During the first five years of membership, withdrawals are assumed to occur at the following rates:

Year of Membership	Non-charter school members	Charter school members
1 <sup>st</sup>	22.5%	35.0%
2 <sup>nd</sup>	22.5%	30.0%
3 <sup>rd</sup>	20.0%	25.0%
4 <sup>th</sup>	20.0%	20.0%
5 <sup>th</sup>	15.0%	20.0%

The rates used after the first five years of membership are shown in Table 1.

## Section 3 (continued)

### 3.8 Summary of Methods and Assumptions

#### Salary scale

Salaries are assumed to increase at the rate of 5.0% per year for the first 5 years of employment and 3.50% thereafter.

#### Disability

Disabilities are assumed to occur at rates based on the actual experience of the retirement system. The rates used are shown in Table 3.

#### Retirement

Retirements occur at rates based on the actual experience of the retirement system. The age-related rates used are shown in Table 2. The rates are different for those eligible to retire under the Rule of 80 and those not eligible to retire under the Rule of 80.

#### Deferred Vested

The liability for deferred vested members with no benefit information provided in the member data by the System is assumed to be 125% of the member's total accumulated contributions.

#### Family Structure

The probability of a participant being married, and the probable number of children are based on a table constructed by the Social Security Administration, modified to reflect the experience of the retirement system. The rates used are shown in Table 4. For married participants, husbands are assumed to be 3 years older than their wives.

#### Gender

Members with no gender provided in the member data by the System are assumed to be female.

#### Usage of Cash-out Option

Participants terminating in vested status are given the option of taking a refund of their accumulated participant contributions instead of a deferred retirement benefit. Active members who terminate in the future with a vested benefit are assumed to take a deferred vested annuity, unless a refund of contributions and interest is greater than the actuarial present value of their vested deferred benefit.

#### Future Benefit Increases or Additional Benefits

When funding is adequate, the Board may authorize cost of living adjustments (COLAs), as noted in the summary of plan provisions. This valuation assumes that no future COLAs will be awarded.

#### Actuarial Valuation Method – Entry Age Normal

Entry Age Normal cost method. Under this method, the actuarial value of projected benefits for each individual participant is allocated as a level percentage of compensation over the working lifetime of the participant between the date of employment and assumed date of exit.



## Section 3 (continued)

### 3.8 Summary of Methods and Assumptions

#### Amortization of Unfunded Liability

Amortization is based on a 15-year closed, level dollar amount. All future changes in the accrued liability due to amendments, experience gains and losses, and assumption changes are amortized over a 15-year closed, layered method. The initial amortization base was created for the unfunded actuarial accrued liability as of January 1, 2022.

#### Employer Contribution – interest adjustment

The total contributions include an interest adjustment of one-half year's interest at the valuation interest rate to better reflect timing of contributions.

#### Valuation of Assets

The actuarial value of assets is based upon a smoothed market value method. Under this method, asset returns in excess of or less than the expected investment return on market value of assets will be reflected in the actuarial value of assets over a five-year period. The plan's actuarial value of assets will be set equal to the plan's market value of assets less the expense and contingency reserve as of January 1, 2022. The calculation of the Actuarial Value of Assets is based on the following formula:

$$MV - 80\% \times G/(L)_1 - 60\% \times G/(L)_2 - 40\% \times G/(L)_3 - 20\% \times G/(L)_4 - \text{Expense and Contingency Reserve}$$

MV = the market value of assets as of the valuation date

$G/(L)_i$  = the asset gain or (loss) for the i-th year preceding the valuation date

#### Changes in Methods & Assumptions from the Prior Valuation

- Actuarial value of assets set equal to market value of assets less expense and contingency reserve as of January 1, 2022.
- Five-year smoothing of assets based on difference between the actual investment income and expected for 2022 and later years.
- Limit the actuarial value of assets to not less than 80% and not greater than 120% of the market value of assets (less expense and contingency reserve).
- Plan's actuarial cost method changed from Unfunded Frozen Actuarial Accrued Liability to Entry Age Normal Actuarial Accrued Liability.
- Implemented a 15-year, level dollar, closed amortization period with layered amortization for future changes.
- One-half year's interest adjustment at the valuation's interest rate to better reflect the timing of contributions.
- Lowered the investment return assumption from 7.50% to 7.00%, net of investment expenses.
- Updated mortality from RP-2014 with mortality improvement scale MP-2015 to PubG-2010 (below median), amount weighted with mortality improvement scale MP-2021.
- Updated retirement, withdrawal, and disability rates.
- Decreased the deferred vested members assumption from 150% to 125% of the member's total accumulated contributions.

## Section 3 (continued)

### 3.8 Summary of Methods and Assumptions

Table 1  
Withdrawal Rates  
Annual Rates Per 1,000 Members

Age	Rate	Age	Rate
20	170.0	45	76.0
21	170.0	46	73.0
22	170.0	47	70.0
23	170.0	48	69.0
24	170.0	49	68.0
25	167.0	50	67.0
26	164.0	51	67.0
27	161.0	52	65.0
28	158.0	53	60.0
29	155.0	54	55.0
30	152.0	55	50.0
31	149.0	56	47.0
32	145.0	57	45.0
33	141.0	58	43.0
34	137.0	59	41.0
35	133.0	60	39.0
36	129.0	61	0.0
37	120.0	62	0.0
38	111.0	63	0.0
39	102.0	64	0.0
40	93.0		
41	88.0		
42	85.0		
43	82.0		
44	79.0		

## Section 3 (continued)

### 3.8 Summary of Methods and Assumptions

**Table 2**  
**Retirement Rates**  
**Annual Rates Per 1,000 Members**

Age	Rule of 80 Rate	Not Rule of 80 Rate
50 - 51	200.0	N/A
52 - 54	150.0	N/A
55	200.0	N/A
56 - 59	150.0	N/A
60	180.0	75.0
61 - 63	180.0	100.0
64	180.0	175.0
65	350.0	250.0
66 - 71	250.0	150.0
72	1,000.0	1,000.0

## Section 3 (continued)

### 3.8 Summary of Methods and Assumptions

**Table 3**  
**Disability Rates**  
**Annual Rates Per 1,000 Members**

Age	Males	Rate	Females	Age	Males	Rate	Females
20	0.00		0.00	45	1.50		1.00
21	0.00		0.00	46	1.60		1.10
22	0.00		0.00	47	1.70		1.20
23	0.00		0.00	48	1.80		1.30
24	0.00		0.00	49	1.90		1.40
25	0.00		0.00	50	2.00		1.50
26	0.00		0.00	51	2.30		1.70
27	0.00		0.00	52	2.50		1.90
28	0.00		0.00	53	2.80		2.10
29	0.00		0.00	54	3.00		2.50
30	0.40		0.40	55	3.30		3.00
31	0.40		0.40	56	3.50		3.50
32	0.40		0.40	57	3.80		4.00
33	0.40		0.40	58	4.00		4.00
34	0.40		0.40	59	4.50		4.00
35	0.40		0.40	60	5.00		4.00
36	0.50		0.45	61	5.50		4.00
37	0.50		0.50	62	6.00		4.00
38	0.60		0.60	63	6.00		4.00
39	0.70		0.70	64	6.00		4.00
40	0.80		0.75	65	6.00		4.00
41	1.00		0.80				
42	1.10		0.85				
43	1.30		0.90				
44	1.40		0.95				

## Section 3 (continued)

### 3.8 Summary of Methods and Assumptions

**Table 4**  
**Family Structure**

Male	Age		Age of youngest child	Average number of children	Probability of being married	Probability of children if married
	Male	Female				
20	17	2	.90	.30	.50	
21	18	2	.90	.35	.50	
22	19	2	.98	.40	.50	
23	20	2	.98	.46	.53	
24	21	3	1.05	.53	.56	
25	22	3	1.13	.60	.59	
26	23	4	1.20	.67	.62	
27	24	4	1.28	.74	.65	
28	25	4	1.35	.76	.67	
29	26	5	1.43	.78	.69	
30	27	5	1.50	.80	.71	
31	28	6	1.58	.82	.73	
32	29	6	1.65	.84	.75	
33	30	7	1.80	.85	.76	
34	31	7	1.95	.86	.77	
35	32	8	2.10	.87	.78	
36	33	8	2.10	.87	.79	
37	34	9	2.10	.87	.80	
38	35	9	2.30	.87	.79	
39	36	10	1.95	.87	.78	
40	37	10	1.88	.87	.77	
41	38	11	1.80	.87	.76	
42	39	11	1.73	.87	.75	
43	40	11	1.73	.87	.72	
44	41	12	1.65	.87	.69	
45	42	12	1.65	.86	.66	
46	43	12	1.58	.86	.63	
47	44	12	1.58	.86	.60	
48	45	12	1.50	.85	.56	
49	46	12	1.43	.85	.52	

## Section 3 (continued)

### 3.8 Summary of Methods and Assumptions

**Table 4**  
**Family Structure**  
 (continued)

Male	Age		Age of youngest child	Average number of children	Probability of being married	Probability of children if married
	Female					
50	47		13	1.43	.85	.48
51	48		13	1.35	.85	.44
52	49		13	1.35	.85	.40
53	50		13	1.35	.85	.37
54	51		13	1.35	.84	.34
55	52		13	1.28	.84	.31
56	53		13	1.28	.83	.28
57	54		13	1.28	.83	.25
58	55		13	1.28	.83	.23
59	56		13	1.20	.82	.21
60	57		13	1.20	.81	.19
61	58		13	1.20	.80	.17
62	59		13	1.20	.79	.15
63	60		13	1.20	.78	.13
64	61		13	1.20	.77	.11
65	62		13	1.13	.76	.09
66	63		13	1.13	.75	.07
67	64		13	1.13	.74	.05
68	65		13	1.13	.73	.04
69	66		13	1.05	.72	.03
70	67		13	1.05	.71	.02
71	68		13	1.05	.70	.01

## Section 3 (continued)

### 3.9 Definition of Actuarial Terms

#### Accrued benefit

The benefit earned by a participant as of the date at which the determination is made payable in the form of an annual benefit commencing at normal retirement age. The accrued benefit is payable for the member's lifetime only, however if the total monthly payments at the member's death are less than contributions accumulated with interest, the remaining member contribution balance will be paid to the member's beneficiary.

#### Accumulated plan benefits

The accrued benefits and any other benefits, whether vested or not, that have been earned by the participants covered by the plan as of the date at which the determination is made. These other benefits include any death, early retirement or disability benefits provided under the plan.

#### Actuarial accrued liability

Equal to the actuarial present value of future benefits less the present value of future annual normal costs.

#### Actuarial cost method

The method for allocating the actuarial present value of a pension plan's benefits and expenses to various time periods. An actuarial cost method is also referred to as a funding method.

#### Actuarial gain/(loss)

The difference between the plan's actual experience and that expected based upon a set of actuarial assumptions. A gain occurs when the experience of the plan is more favorable (in terms of cost) than the assumptions projected; a loss occurs when experience is less favorable. May also be referred to as experience gains/(losses).

#### Actuarial present value

See present value.

#### Actuarial valuation

The determination, as of a valuation date, of the annual normal cost, actuarial accrued liability, actuarial value of assets and related actuarial present values for a pension plan.

#### Actuarial value of assets

The value of cash, investments and other property belonging to a pension plan determined by the actuary for the purpose of an actuarial valuation. Actuarial asset methods are generally designed to reduce fluctuations in asset value due to large variations in returns from year to year. Actuarial values are generally a smoothed market value that recognize gains and losses over time.

#### Amortization

The spreading of a present value or a cost over a period of years. A plan's unfunded actuarial accrued liability is amortized over a period of years.

## Section 3 (continued)

### 3.9 Definition of Actuarial Terms

#### Fiscal year

The year on which the plan sponsor maintains its financial records.

#### Funded

Provided by plan assets. A liability is fully funded when assets exceed or equal the liability.

#### Normal cost

That portion of the actuarial present value of pension plan benefits and expenses which is allocated to a valuation year by the actuarial cost method.

#### Normal retirement age

An age defined in the plan for purposes of establishing when a terminated participant is entitled to an accrued benefit.

#### Normal retirement benefit

The benefit payable when it commences at the normal retirement age.

#### Participant

A person covered by a pension plan in accordance with its terms including active participants, retired participants and beneficiaries, vested terminations, and vested transfers.

#### Plan year

The year on which the plan maintains its financial records.

#### Present value

The value of an amount or series of amounts payable at various times, determined as of a given date by the application based on a particular set of actuarial assumptions. It is a single sum which reflects the time value of money and the probabilities of payment.

#### Rate of return

The actual or expected investment income as a percentage of a plan's average assets.

#### System

Public School Retirement System of the City of St. Louis, Missouri.

#### Unfunded actuarial accrued liability

The excess of the actuarial accrued liability over the actuarial value of assets.

#### Vested benefit

A benefit that is not forfeited if the participant terminates employment.



## Section 4 – ASOP 51 Disclosures

Funding future retirement benefits prior to when those benefits become due involves assumptions regarding future economic and demographic experience. These assumptions are applied to calculate actuarial liabilities, current contribution requirements and the funded status of the system. However, to the extent future experience deviates from the assumptions used, variations will occur in these calculated values. These variations create risk to the system. Understanding the risks to the funding of the system is important. Actuarial Standard of Practice No. 51 (“ASOP 51”) requires certain disclosures of potential risks to the system and provides useful information for intended users of actuarial reports that determine system contributions or evaluate the adequacy of specified contribution levels to support benefit provisions.

Under ASOP 51, risk is defined as the potential of actual future measurements deviating from expected future measurements resulting from actual future experience deviating from actuarially assumed experience.

It is important to note that not all risk is negative, but all risk should be understood and accepted based on knowledge, judgement and educated decisions. Future measurements may deviate in ways that produce positive or negative financial impacts to the system.

In the actuary’s professional judgment, the following risks may reasonably be anticipated to significantly affect the system’s future financial condition.

- Investment risk – potential that the investment return will be different than the 7.00% expected in the actuarial valuation
- Longevity risk – potential that participants live longer than expected from the valuation mortality assumptions
- Contribution risk – potential that the contribution will be different than the recommended contribution in the actuarial valuation

The following information is provided to comply with ASOP 51 and furnish beneficial information on potential risks to the system. This list is not all-inclusive; it is an attempt to identify the most significant risks and how those risks might affect the results shown in this report.

## Section 4 (continued)

Note that ASOP 51 does not require the actuary to evaluate the ability or willingness of the system sponsor to make contributions to the system when due, or to assess the likelihood or consequences of potential future changes in law. In addition, this valuation report is not intended to provide investment advice or to provide guidance on the management or reduction of risk. Buck welcomes the opportunity to assist in such matters as part of a separate project or projects utilizing the appropriate staff and resources for those objectives.

### Investment Risk

System costs are very sensitive to the market return. Any lower than assumed return on assets will increase costs:

- The lower market return will cause the market value of assets to be lower than expected.
- The plan uses a 5-year smoothing method of assets based on the difference between the actual investment income and the expected income to help mitigate volatility year over year.
- Historical experience of market returns is shown in Section 2.4: Summary of Investment Yield Performance. This historical experience illustrates how returns can vary over time.

### Longevity Risk

System costs will be increased as participants are expected to live longer. This is because:

- Benefits are paid over a longer lifetime when life expectancy is expected to increase. The longer duration of payments leads to higher liabilities.
- Health care has been improving which increases the life expectancy of participants. As health care improves, costs to the system will increase.
- The mortality assumption for the System does assume future improvement in mortality. Any improvement in future mortality greater than that expected by the current mortality assumption would lead to increased costs for the System.

### Contribution Risk

There is a risk associated with the employer's contribution when the actual amount and recommended amount differ. This is because:

- When the actual contribution is lower than the recommended contribution the System may not be sustainable in the long term.
- Any underpayment of the contribution will increase future contribution amounts to help pay off the additional Unfunded Actuarial Accrued Liability associated with any lower than recommended contribution amounts.
- Because of the legislative changes made to the employer contribution amounts, this is a significant risk to the plan. The actuarially determined contribution in this valuation is 14.28% of covered payroll. However, the annual required contribution due to the changes is only 14.00% of covered payroll.

## Section 4 (continued)

### System Maturity Measures:

There are certain measures that may aid in understanding the significant risks to the system.

Ratio of Retired Liability to Total Liability	As of January 1 <sup>st</sup>				
	2018	2019	2020	2021	2022
1. Retirees and Beneficiaries	901,926,852	897,846,332	891,935,875	879,008,937	882,739,730
2. Total Accrued Liability	1,411,197,070	1,414,382,087	1,423,729,232	1,397,928,681	1,279,847,074
3. Ratio [(1) / (2)]	63.9%	63.5%	62.6%	62.9%	69.0%

A mature system will often have a ratio above 60 - 65 percent. A higher percentage will generally indicate an increased need for asset / liability matching.

Ratio of Cash Flow to Assets	As of December 31 <sup>st</sup>				
	2017	2018	2019	2020	2021
1. Contributions	53,668,896	63,029,522	60,922,391	59,429,613	62,107,170
2. Benefit Payments	112,950,471	114,010,652	113,101,170	112,681,273	113,687,442
3. Cash Flow [(1) - (2)]	(59,281,575)	(50,981,130)	(52,178,779)	(53,251,660)	(51,580,272)
4. Market Value of Assets	914,082,259	819,449,893	893,295,602	914,776,954	972,827,656
5. Ratio [(3) / (4)]	-6.49%	-6.22%	-5.84%	-5.82%	-5.30%

When this cash flow ratio is negative more cash is being paid out than deposited in the fund. Negative cash flow means the fund needs to rely on investment returns to cover benefit payments and at the same time may need to invest in more liquid assets to cover the benefit payments. More liquid assets may not garner the same returns as less liquid assets and therefore increase the investment risk. However, the low magnitude of the ratio implies there may already be enough liquid assets to cover the benefit payments, less investment return is needed to cover the shortfall, or only a small portion of assets will need to be converted to cash. Therefore, the investment risk is likely not amplified at this time. This maturity measure should be monitored for continual negative trend with greater magnitude.

## Section 4 (continued)

Contribution Volatility	As of January 1 <sup>st</sup>				
	2018	2019	2020	2021	2022
1. Market Value of Assets	914,082,259	819,449,893	893,295,602	914,776,954	972,827,656
2. Payroll	265,773,659	263,772,380	272,973,377	264,676,845	259,440,417
3. Asset Volatility Ratio (AVR) [(1) / (2)]	3.44	3.11	3.27	3.46	3.75
4. Accrued Liability <sup>10</sup>	1,411,197,070	1,414,382,087	1,423,729,232	1,397,928,680	1,279,847,074
5. Liability Volatility Ratio (LVR) [(4) / (2)]	5.31	5.36	5.22	5.28	4.93

Systems that have higher asset-to-payroll ratios experience more volatile employer contributions (as a percentage of payroll) due to investment return. For example, a system with an asset-to-payroll ratio of 10 may experience twice the contribution volatility due to investment return volatility than a system with an asset-to-payroll ratio of 5. Systems that have higher liability-to-payroll ratios experience more volatile employer contributions (as a percentage of payroll) due to changes in liability. For example, if an assumption change increases the liability of two systems by the same percent the system with a liability-to-payroll ratio of 10 may experience twice the contribution volatility than a system with a liability-to-payroll ratio of 5.

<sup>10</sup>Actuarial cost method is Entry Age Normal for January 1, 2022. Years prior to 2022 is the Frozen Entry Age Normal cost method.