CHEIRON *Classic Values, Innovative Advice*

Employees Retirement System of the City of St. Louis

Actuarial Valuation as of October 1, 2023

Produced by Cheiron

January 2024

TABLE OF CONTENTS

Letter Of Transmittal

January 31, 2024

Board of Pension Trustees
Employees Retirement System of the City of St. Louis
1114 Market Street, Suite 900
St. Louis, Missouri 63101

Dear Members of the Board:

At your request, we have conducted an actuarial valuation of the Employees Retirement System of the City of St. Louis as of October 1, 2023. The valuation is organized as follows:

- In Section I **Board Summary,** we describe the purpose of an actuarial valuation and summarize the key results found in this valuation.

- The **Main Body** of the report presents details on the System:
    - Section II - Identification and Assessment of Risk
    - Section III - Assets
    - Section IV - Liabilities
    - Section V - Contributions
    - Section VI - Accounting Statement Information

- In the **Appendices,** we conclude our report with detailed information describing the System's membership (Appendix A), actuarial assumptions and methods employed (Appendix B), and a summary of pertinent plan provisions (Appendix C).

The results of this report rely on future System experience conforming to the underlying assumptions. To the extent that actual System experience deviates from the underlying assumptions, the results will vary accordingly. The actuarial assumptions were adopted by the Board based on our recommendations from the experience study performed for the period October 1, 2014 through September 30, 2019.

The purpose of this report is to present the annual actuarial valuation of the Employees Retirement System of the City of St. Louis. This report is for the use of the Board and its auditors in preparing financial reports in accordance with applicable law and accounting requirements. The report does not include calculations related to GASB Statements No. 67 and 68, which are provided in a separate report.

In preparing our report, we relied on information supplied by the Employees Retirement System of the City of St. Louis staff. This information includes, but is not limited to, plan provisions, employee data, and financial information. We performed an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standards of Practice No. 23.
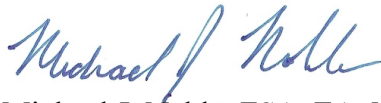
Board of Pension Trustees
January 31, 2024
Page ii

This report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices and our understanding of the Code of Professional Conduct and applicable Actuarial Standards of Practice as set out by the Actuarial Standards Board as well as applicable laws and regulations. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys, and our firm does not provide any legal services or advice.

This actuarial report was prepared exclusively for the Employees Retirement System of the City of St. Louis for the purpose described herein. Other users of this report are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to such other users.

Sincerely,
Cheiron

Michael J. Noble, FSA, EA, MAAA
Principal Consulting Actuary

Patrick T. Nelson, FSA, CERA, EA, MAAA
Consulting Actuary

SECTION I – BOARD SUMMARY

The primary purpose of the actuarial valuation and this report is to measure, describe and identify as of the valuation date:

- The financial condition of the System,

- Past and expected trends in the financial progress of the System,

- The employers' contributions for Fiscal Year Ending 2024, and

- Information required for accounting statements.

In the balance of this Board Summary, we present (A) the key findings of this valuation including a summary of all key financial results, (B) an examination of the historical trends, and (C) the projected financial outlook for the System.

A. Key Findings of this Valuation

The key results of the October 1, 2023 actuarial valuation are:

- The System's funded ratio, the ratio of actuarial asset value over liabilities, decreased from 76.9% as of October 1, 2022 to 73.5% as of October 1, 2023.

- The unfunded actuarial liability (UAL) for the System increased from $259 million on October 1, 2022 to $306 million on October 1, 2023.

- The actuarially determined employer contribution rate for the City as a percent of total compensation increased from 17.05% as of October 1, 2022 to 17.51% as of October 1, 2023. The increase in the contribution rate was due to the decrease in the funding ratio, however, the impact on the percentage of payroll was partially mitigated by the increase in payroll during the valuation year.

- For the "Lawsuit Beneficiary Employers", the actuarially determined contribution rate has been decreased by 0.07% of compensation. Further information about this adjustment can be found in the description of the amortization method in Appendix B.

- There was an actuarial experience loss during the year of $54.5 million.

  o During the year ended September 30, 2023, the System's assets had a 9.36% return on a market value basis, but due to smoothing of prior investment gains and losses, the return on the actuarial asset value was 3.20% (as compared to 7.25% investment return assumption). This resulted in an actuarial loss on investments of $34.1 million.

  o On the liability side, the System experienced a total loss of $20.3 million. Notable losses were $19.6 million due to salary increases being greater than expected, $3.9 million from the COLA increase for retiree benefits being greater than expected, and $2.2 million due to active members retiring earlier than expected. These losses were partially offset by gains of $1.6 million from inactive mortality and $5.1 million from active members leaving for reasons other than retirement. A detailed listing of all experience gains and losses can be found in Table IV-3.

  o Offsetting the actuarial experience loss, contributions were greater than expected, which created a $1.6 million gain.

SECTION I – BOARD SUMMARY

The following Table I-1 summarizes all the key results of the valuation with respect to the System's membership, assets and liabilities, and contributions. The results are presented and compared for both the current and prior plan year.

Table I-1 Employees Retirement System of the City of St. Louis Summary of Principal Results			
Valuation as of:	**October 1, 2022**	**October 1, 2023**	**% Change**
Participant Counts			
Active Participants[1]	4,472	4,602	2.91%
Disabled Participants	157	149	(5.10%)
Retirees and Beneficiaries	4,892	4,967	1.53%
Terminated Vested Participants	2,635	2,666	1.18%
Total	**12,156**	**12,384**	**1.88%**
Annual Salaries of Active Members	$ 221,930,584	$ 251,919,108	13.51%
Annual Retirement Allowances for Retired Members and Beneficiaries	$ 68,965,237	$ 72,255,712	4.77%
Assets and Liabilities			
Actuarial Liability (AL)	$ 1,120,390,123	$1,153,001,981	2.91%
Actuarial Value of Assets (AVA)	861,417,992	847,397,718	(1.63%)
Unfunded Actuarial Liability (UAL)	$ 258,972,131	$ 305,604,263	18.01%
Funded Ratio (AVA / AL)	76.9%	73.5%	
Market Value of Assets (MVA)	$ 757,986,602	$ 786,143,848	3.71%
Funded Ratio (MVA / AL)	67.7%	68.2%	
Contributions as a Percentage of Payroll	**Fiscal Year 2023**	**Fiscal Year 2024**	
Normal Cost Rate	5.56%	5.47%	
Administrative Expense Rate	0.40%	0.40%	
City UAL Rate	11.09%	11.64%	
Total City Contribution Rate	17.05%	17.51%	
Reduction in UAL Rate for Lawsuit Beneficiary Employers	0.08%	0.07%	
Total Contribution Rate for Lawsuit Beneficiary Employers	16.97%	17.44%	
Actuarially Determined Contribution	$ 37,806,968	$ 44,094,668	16.63%

[1]Includes 361 DROP participants as of October 1, 2022 and 334 DROP participants as of October 1, 2023.

SECTION I – BOARD SUMMARY

B. Historical Trends

Despite the fact that for most retirement systems the greatest attention is given to the current valuation results, and in particular, the size of the current unfunded actuarial liability and the employer's contribution, it is important to remember that each valuation is merely a snapshot in the long-term progress of a pension fund. It is more important to judge a current year's valuation result relative to historical trends, as well as trends expected into the future.

Assets and Liabilities

There was an increase in the market value of assets (MVA) from $758 million to $786 million, due to a 9.36% investment return during the year. This is greater than the investment return assumption of 7.25% per year. The actuarial value of assets (AVA) decreased from 2022 to 2023 returning 3.20%, which reflects the large investment loss from 2022 and a smaller investment loss from 2020, partially offset by the moderate investment gain in 2021 and smaller investment gain in 2023. With the asset smoothing method in place, the actuarial value of assets has tracked a smoother path through the volatility of the market over recent years.
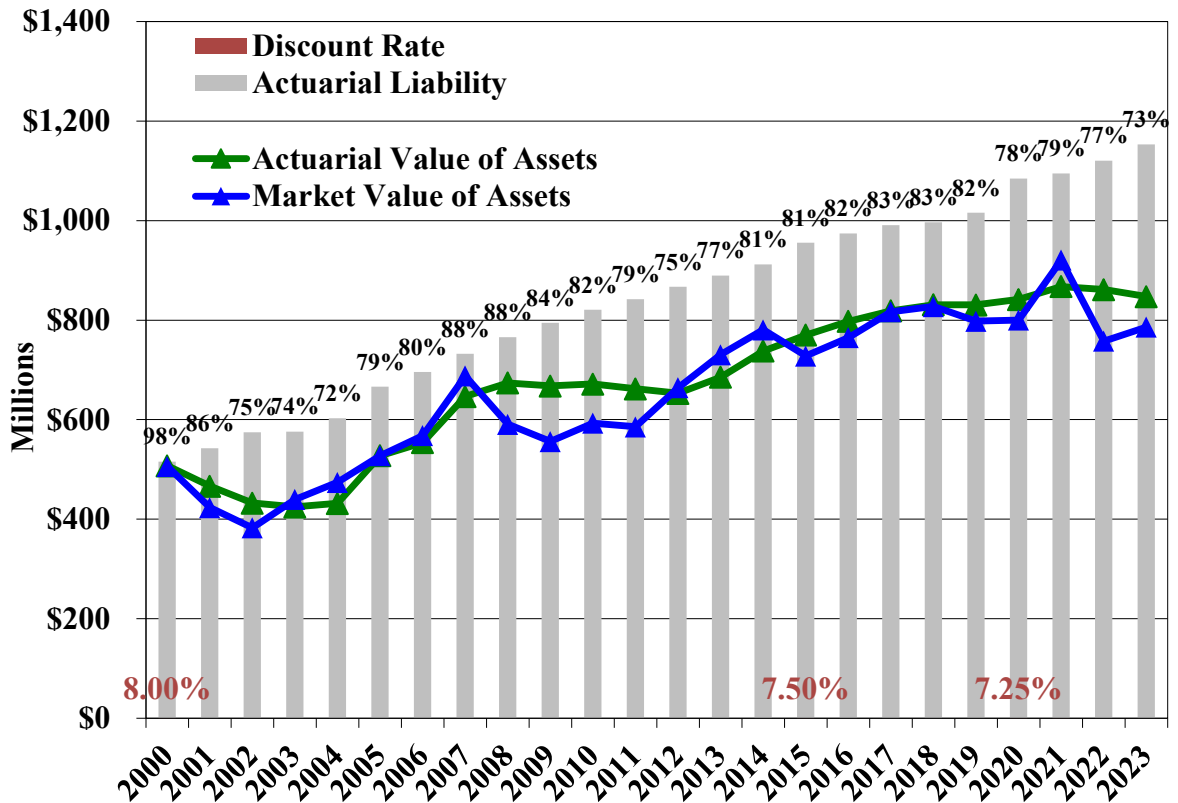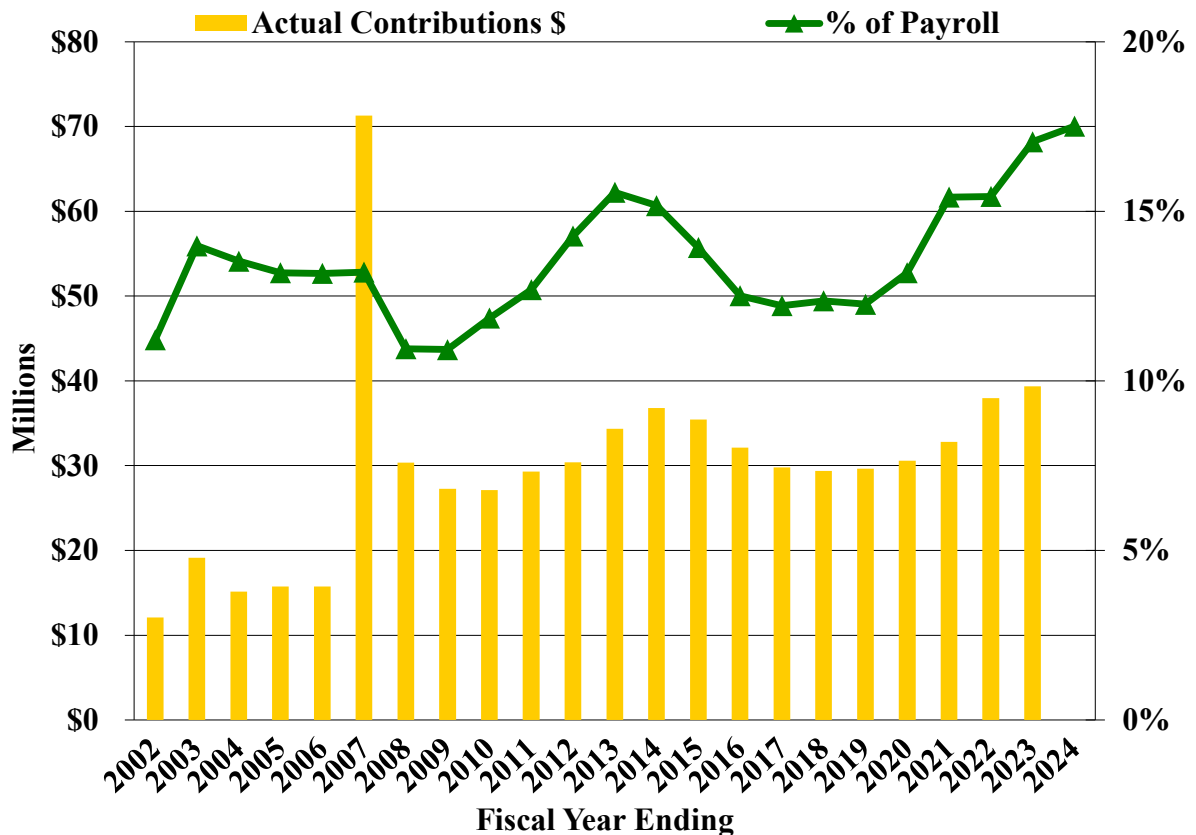
SECTION I – BOARD SUMMARY

The previous chart compares the actuarial value of assets to the actuarial liabilities and shows the funded ratio, which is a comparison of the Actuarial Value of Assets and Actuarial Liability. This chart shows that the funded ratio had decreased for the four valuations prior to 2013 due to the delayed recognition of the substantial market losses in 2008 and 2009, then slowly increased as the market rebounded from 2012 through 2019.

The funded ratio decreased in 2020 primarily as a result of demographic and economic assumption changes, including a decrease in the investment return assumption, as well as lower than expected asset returns. The funded ratio increased in 2021 as a result of higher than expected asst returns, but again decreased in 2022 and 2023 because of lower than expected asset returns and demographic losses.

The numbers in red denote changes to the net investment return assumption.

Contribution Rates

The yellow bars in the graph below show the dollar amount of contributions made to the System (depicted on the left-hand scale) since Fiscal Year Ending 2002. The green line shows the actuarial contribution rate (combined for all employers) as a percent of payroll (depicted on the right-hand scale). Members do not make contributions to the System. The actuarial contribution rate as a percent of payroll increased from 17.05% of payroll for fiscal year 2023 to 17.51% of payroll for fiscal year 2024 primarily due to investment and liability losses.

SECTION I – BOARD SUMMARY

Participant Trends
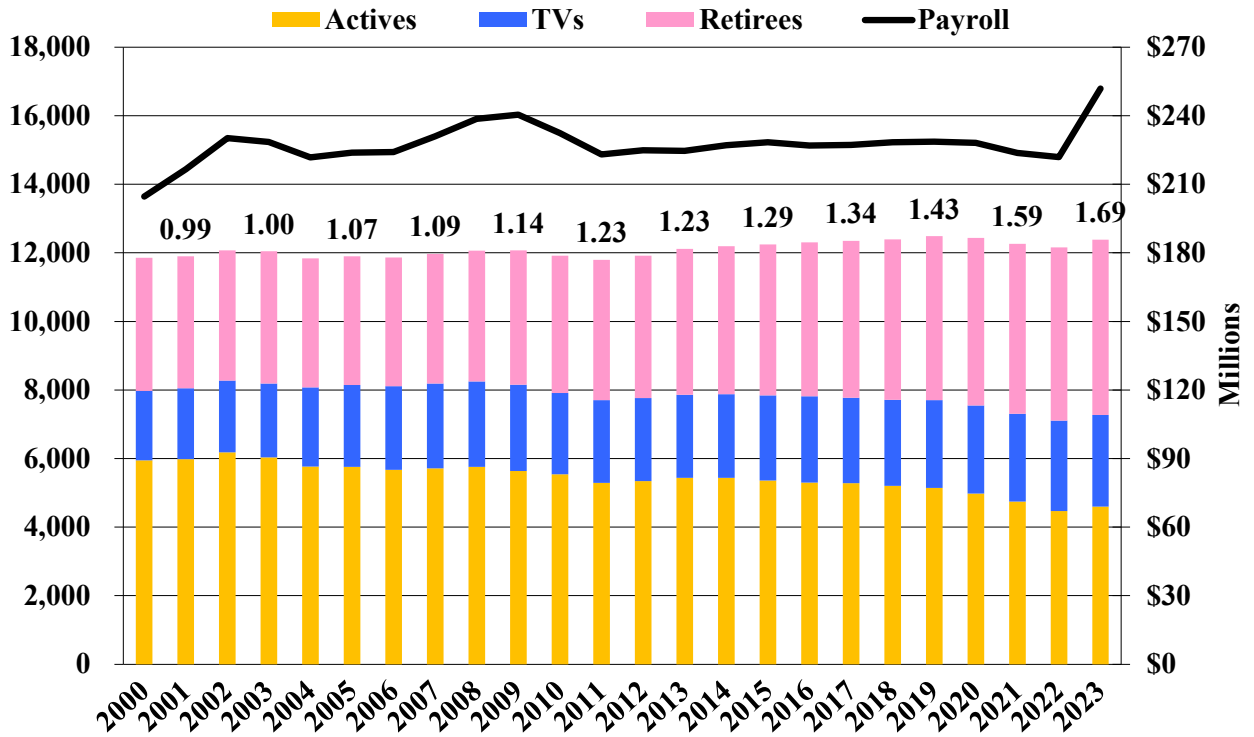
The above chart provides a measure for the maturity in the System, by comparing the ratio of inactive members (retirees and terminated-vesteds) to active members. The inactive-to-active ratio has generally increased since 2000, from 0.99 inactive members for each active member to 1.69 inactive members for each active member today. This increase is not necessarily bad in itself, but as more of the liability moves from actives to inactives, the System will experience more volatility in contribution rates when actuarial gains and losses are recognized.

SECTION I – BOARD SUMMARY

## C. Future Expected Financial Trends

The analysis of projected financial trends is perhaps the most important component of this valuation. In this section, we present the implications of the October 1, 2023 valuation results in terms of (1) the projected employer contributions, and (2) the projected System's funded status (ratio of assets over liabilities). We assume future investment returns of 7.25% each year. The projections assume there will be no future gains or losses on the liability and that the total covered plan payroll will increase at the rate of 2.5% per year.

1. Contribution Rate Projection

The chart shows the employer's projected actuarially determined combined contribution rates (gold bars). The years shown in the charts are plan years beginning October 1st.

Baseline returns of 7.25%

The chart below shows that the actuarially determined contribution rate will gradually increase from 17.5% to 19.7% by 2027 and remain at about that level until the 2015 unfunded liability base has been fully amortized. In 2036, the contribution rate drops sharply to 12.5%. These projections assume that the System earns the assumed investment rate, 7.25% per year, on the market value of assets. The expected increase in contributions over the next few years is due to the continued recognition of this year's investment loss into the actuarial value of assets.
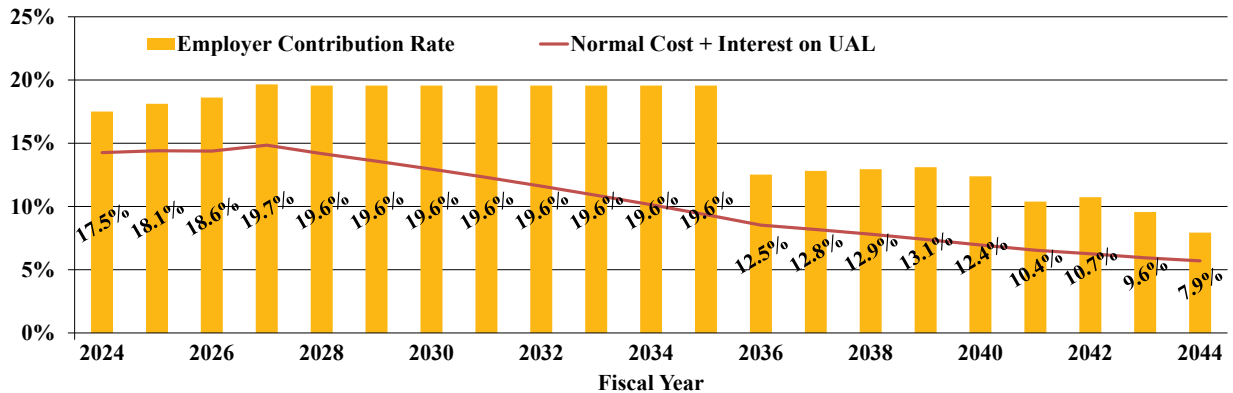
SECTION I – BOARD SUMMARY

2. **Asset and Liability Projection**

This next projection chart compares the market value of assets (blue line) and the actuarial or smoothed value of assets (green line) to the System's actuarial liabilities (gray bars). In addition, above the bars, we show the System's funded ratio (ratio of actuarial value of assets to actuarial liabilities). The projections assume that the actuarially determined contributions, as shown in the previous chart, are made each year. The years shown in the chart signify the valuation date as of October 1st.

Baseline returns of 7.25%

Assuming that the System earns the investment rate assumption of 7.25%, the funded ratio will increase from 73% to 99% during the 20-year projection period.
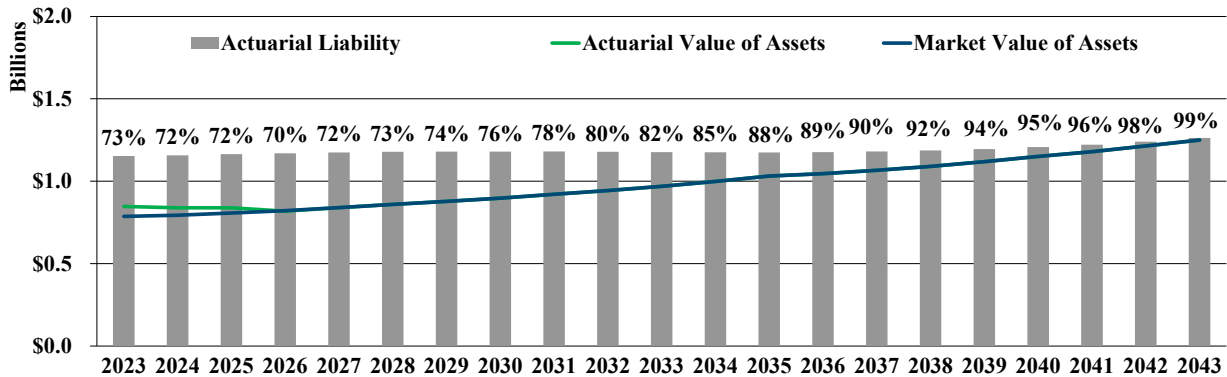
SECTION II – IDENTIFICATION AND ASSESSMENT OF RISK

Actuarial valuations are based on a set of assumptions about future economic and demographic experience. These assumptions represent a reasonable estimate of future experience, but actual future experience will undoubtedly be different and may be significantly different. This section of the report is intended to identify the primary risks to the System, provide some background information about those risks, and provide an assessment of those risks. Some of the charts within this section compare measures calculated for the Employees Retirement System of the City of St. Louis to plans within the *Public Plans Database*. Information regarding this data can be found at https://publicplansdata.org/.

Identification of Risks

The fundamental risk to a pension plan is that the contributions needed to pay the benefits become unaffordable. While we believe it is unlikely that the System by itself would become unaffordable, the contributions needed to support the System may differ significantly from expectations. While there are a number of factors that could lead to contribution amounts deviating from expectations, the primary sources are:

- Investment risk,

- Interest rate risk,

- Longevity and other demographic risks, and

- Assumption change risk.

Other risks that we have not identified may also turn out to be important.

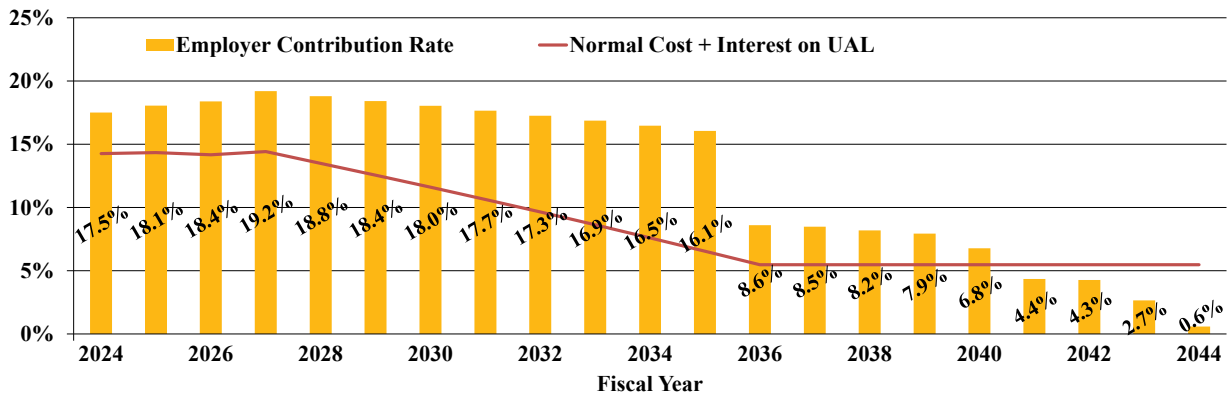## SECTION II – IDENTIFICATION AND ASSESSMENT OF RISK

Investment Risk is the potential for investment returns to be different than expected. Lower investment returns than anticipated will increase the Unfunded Actuarial Liability necessitating higher contributions in the future unless there are other gains that offset these investment losses. The potential volatility of future investment returns is determined by the System's asset allocation, and the affordability of the investment risk is determined by the amount of assets invested relative to the size of the plan sponsor or other contribution base.

For stress testing purposes, we include two scenarios to illustrate the impact actual investment returns may have on future funded status and contribution amounts compared to the baseline scenario presented at the end of Section I of this report. The two scenarios are (1) optimistic returns of 8.75% each year and (2) pessimistic returns of 5.75% each year

As with the baseline, we present the implications of the October 1, 2023 valuation results in terms of the projected employer contributions, and projected System's funded status (ratio of assets over liabilities).

1. <u>Optimistic returns of 8.75%</u>

If the System earns 1.50% more than the assumed rate in each year of the projection, the actuarially determined contribution rate will initially increase to about 19.2% as the 2022 investment loss is recognized over the following three years, before falling to 16.1% by 2035. In 2036, the contribution rate would drop to 8.6%. The funded ratio is projected to increase above 100% by 2035 and reach 120% by the end of the 20-year projection period despite minimal contributions being made in the final few years of the period.

SECTION II – IDENTIFICATION AND ASSESSMENT OF RISK

Chart: Actuarial Liability, Actuarial Value of Assets, Market Value of Assets (Billions), 2023–2043

Funded ratios by year: 73% (2023), 73%, 73%, 71%, 74%, 76%, 79%, 82%, 85%, 88%, 92%, 96%, 100%, 102%, 105%, 108%, 111%, 113%, 116%, 118%, 120%
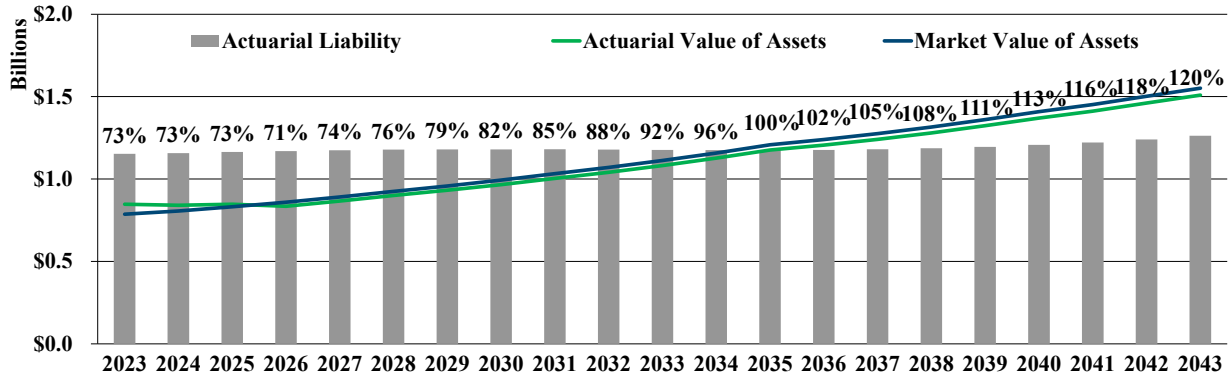
2. Pessimistic returns of 5.75%

If the System earns 1.50% less than the assumed rate in each year of the projection, the actuarially determined contribution rate will increase to 22.7% as of 2035. In 2036, the rate is projected to decrease to 15.9% after the initial unfunded liability has been paid off. The funded ratio will decrease to 69% by 2026 as the 2022 investment loss is recognized, and then increase to 83% by the end of the 20-year projection period due to the significant increase in contributions attributable to the continuous investment losses.

Chart: Employer Contribution Rate and Normal Cost + Interest on UAL, Fiscal Year 2024–2044

Employer Contribution Rate by year: 17.5%, 18.2%, 18.8%, 20.1%, 20.3%, 20.7%, 21.0%, 21.4%, 21.7%, 22.0%, 22.4%, 22.7%, 15.9%, 16.6%, 17.0%, 17.5%, 17.1%, 15.4%, 16.0%, 15.2%, 13.8%

Chart: Actuarial Liability, Actuarial Value of Assets, Market Value of Assets (Billions), 2023–2043

Funded ratios by year: 73% (2023), 72%, 71%, 69%, 69%, 70%, 70%, 71%, 71%, 72%, 74%, 75%, 77%, 77%, 78%, 79%, 80%, 81%, 81%, 82%, 83%
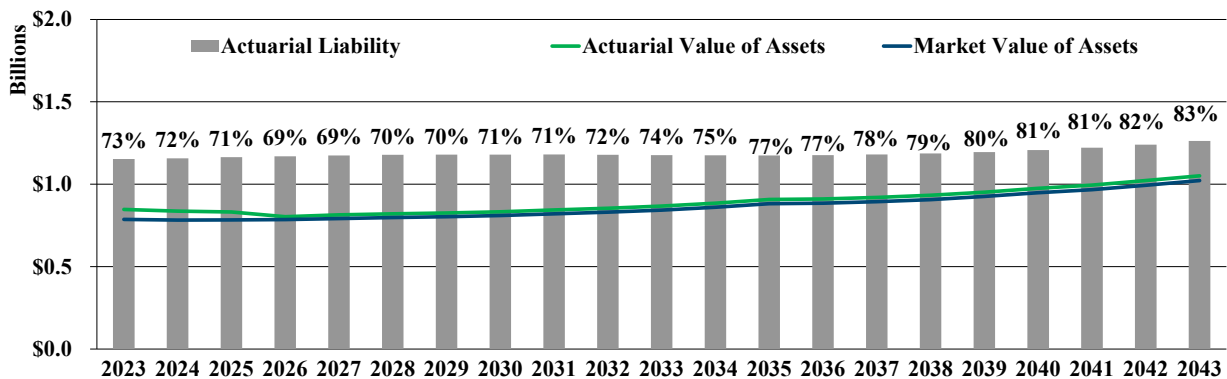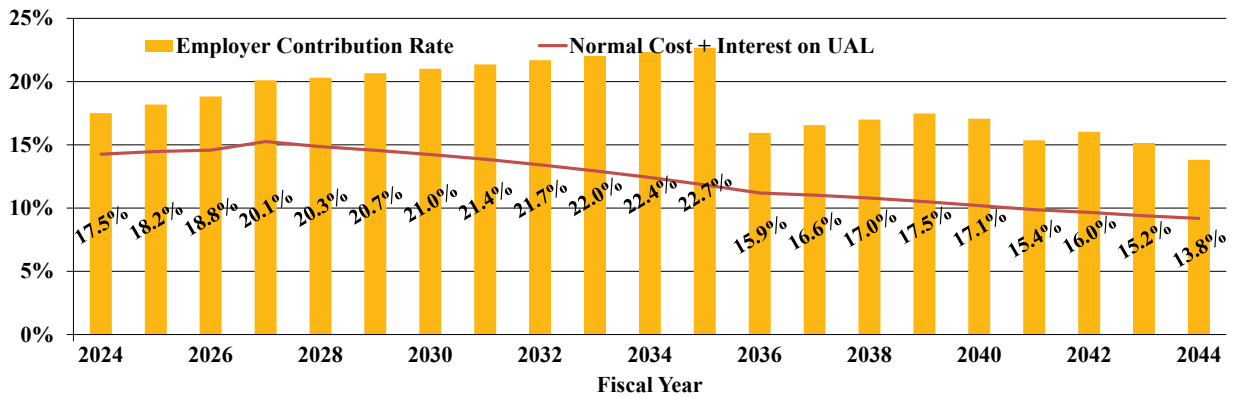
SECTION II – IDENTIFICATION AND ASSESSMENT OF RISK

Low-Default-Risk Obligation Measure (LDROM)

The System invests in a diversified portfolio to achieve the best possible return at an acceptable level of risk. The lowest investment risk portfolio for a pension plan would be composed entirely of low-default-risk fixed income securities whose cash flows match the cash flows needs of the System. However, such a portfolio would have a lower expected rate of return (5.61% as of September 30, 2023) than the diversified portfolio (7.25%). Low-Default-Risk Obligation Measure (LDROM) represents what the Actuarial Liability would be if the System's assets were invested in such a portfolio. As of September 30, 2023, the LDROM is $1.44 billion[1] compared to the Actuarial Liability of $1.15 billion for the System in total. The $0.29 billion difference can be viewed as the expected savings from taking on the investment risk of the diversified portfolio. Alternatively, it can be viewed as the potential cost of eliminating the investment risk of the non-fixed income allocations of the diversified portfolio.

If the System were to invest in the LDROM portfolio, the funded ratios would decrease, and contribution requirements would increase. The security of the System's pension benefits relies on the current assets, future investment earnings, and the ability and willingness of the Plan Sponsor to make future contributions. If the System were to invest in the LDROM portfolio, it would not change the current assets, but it would likely reduce future investment earnings. However, the volatility of future investment earnings and future contributions would be significantly reduced.

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[1] Based on a discount rate equal to the September 30, 2023 FTSE Pension Liability Curve of 5.61% (determined as the single equivalent rate by matching Plan cashflows to the yield curve), and all other assumptions and methods as used to calculate the Actuarial Liability.

SECTION II – IDENTIFICATION AND ASSESSMENT OF RISK

Interest rate risk is the potential for interest rates to be different than expected. For public plans, short-term fluctuations in interest rates have minimal effect on the Plan's liability which is measured based on the expected return on assets. Longer-term trends in interest rates, however, can have a powerful effect on the System. The chart below shows the yield on a 10-year Treasury security compared to the System's assumed rate of return. The difference is a simple measure of the amount of investment risk taken. As interest rates generally declined through 2020, plans faced a choice: maintain the same level of risk and reduce the expected rate of return, maintain the same expected rate of return and take on more investment risk, or some combination of the two strategies. Over the past three years, 10-year Treasury bond yields have increased rapidly from 0.7% as of October 2020 to 4.8% in October 2023. If these higher Treasury bond yields persist, plans may be able to achieve the expected return with less exposure to investment risk. However, if these higher Treasury bond yields prove temporary, plans could quickly find the pressure returning to further reduce discount rates or increase their exposure to investment risk.


Historical Implied Risk Premium
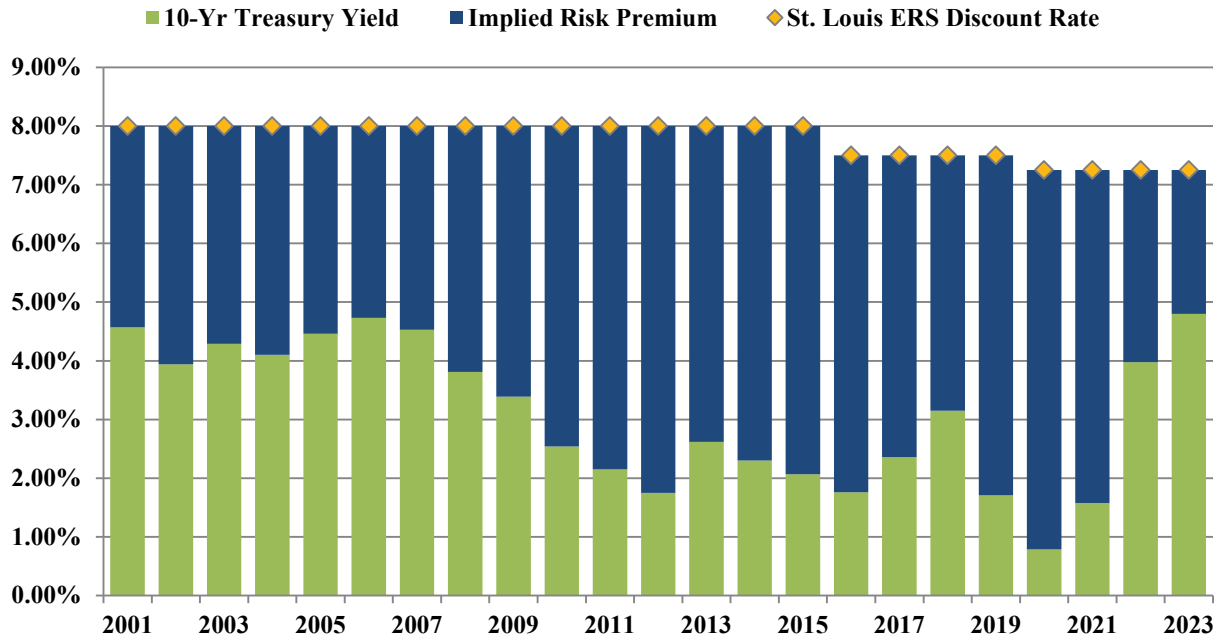
SECTION II – IDENTIFICATION AND ASSESSMENT OF RISK

Longevity and other demographic risks are the potential for mortality or other demographic experience to be different than expected. Generally, longevity and other demographic risks emerge slowly over time and are often dwarfed by other changes, particularly those due to investment returns. The System experienced small demographic gains each year from 2014 through 2018 primarily due to low annual salary increases and low cost-of-living adjustments (COLAs). However, in 2022 and 2023, the System experienced large demographic losses primarily due to inflation creating salary increases greater than expected, as well as larger than expected COLA increases for the year.

Assumption change risk is the potential for the environment to change such that future valuation assumptions are different than the current assumptions. Increases in UAL from assumption changes are related to experience studies in which demographic and economic assumptions were adjusted. Assumption change risk is an extension of the other risks identified, but rather than capturing the risk as it is experienced, it captures the cost of recognizing a change in environment when the current assumption is no longer reasonable. This is demonstrated in the chart below in 2015 and 2020 when assumptions were changed.

The chart below shows how many of the risks mentioned impact the financial status of the System. While a lot of attention is given to demographic assumptions, the primary force on the health of the System is the return on investments earned each year.

Changes in Unfunded Actuarial Liability
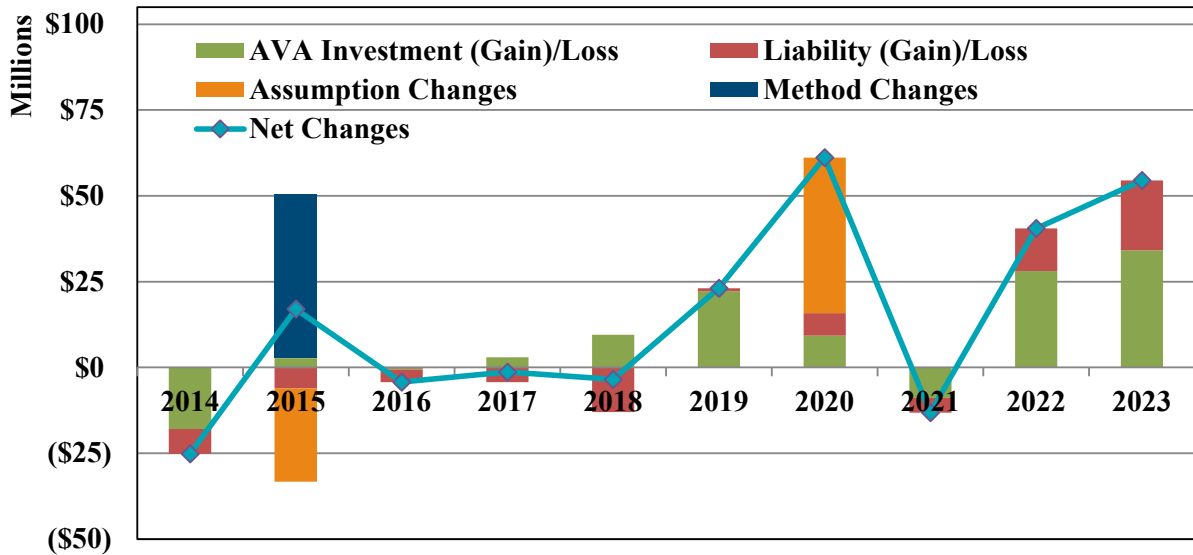
SECTION II – IDENTIFICATION AND ASSESSMENT OF RISK

Plan Maturity Measures

The future financial condition of a mature pension plan is more sensitive to each of the risks identified above than a less mature plan. Before assessing each of these risks, it is important to understand the maturity of this System compared to other plans and how the maturity has changed over time.

Plan maturity can be measured in a variety of ways, but they all get at one basic dynamic – the larger the plan is compared to the contribution or revenue base that supports it, the more sensitive the plan will be to risk. The measures below have been selected as the most important in understanding the primary risks identified for this system.

Inactives per Active (Support Ratio)

One simple measure of plan maturity is the ratio of the number of inactive members (those receiving benefits or entitled to a deferred benefit) to the number of active members. The revenue base supporting the plan is usually proportional to the number of active members, so a relatively high number of inactives compared to actives indicates a larger plan relative to its revenue base as well.
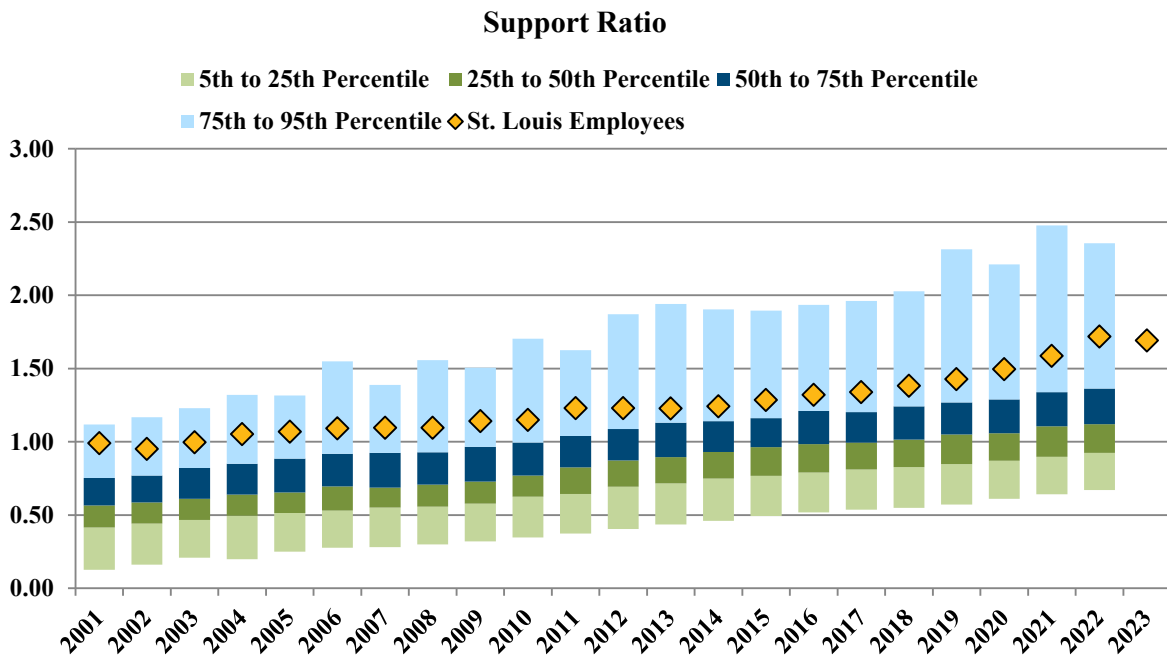
Survey Data from Public Plans Data as of 10/30/2023

The graph above shows the distribution from the 5th to 95th percentile of support ratios for the plans in the Public Plans Data. The gold diamond shows how the Employees Retirement System of the City of St. Louis compares to the other plans.

Whereas the support ratios for the plans as a whole have increased over the period as they mature, the System's support ratio has increased over the period and is among the 75th to 95th percentile of the Public Plans Data meaning that the System is more mature than the average plan in the Database.

SECTION II – IDENTIFICATION AND ASSESSMENT OF RISK

Leverage Ratios

Leverage or volatility ratios measure the size of the plan compared to its revenue base more directly. An asset leverage ratio of 5.0, for example, means that if the System experiences a 10% loss on assets compared to the expected return, the loss would be equivalent to 50% of payroll. The same investment loss for a system with an asset leverage ratio of 10.0 would be equivalent to 100% of payroll. As the System becomes better funded, the asset leverage ratio will increase, and if it were 100% funded, the asset leverage ratio would equal the Actuarial Liability (AL) leverage ratio.

Asset Leverage Ratio
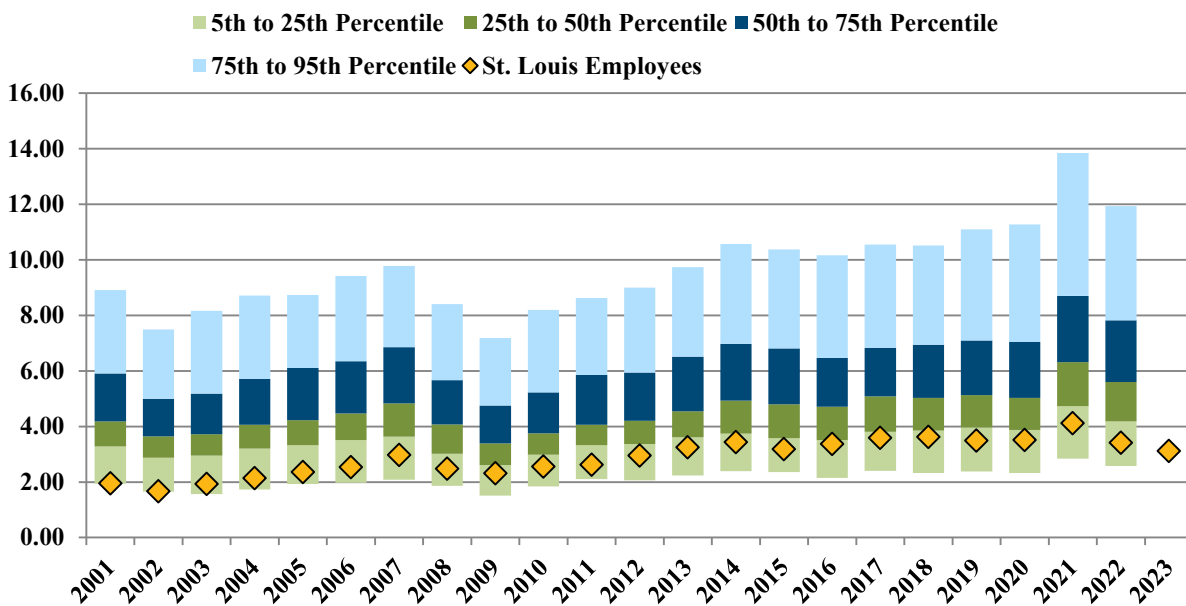
Survey Data from Public Plans Data as of 10/30/2023

The chart above shows the distribution from the 5th to 95th percentile of asset leverage ratios for the plans in the Public Plans Database. The gold diamond shows how the System compares. The System's asset leverage ratio has historically been in the 5th to 25th percentile compared to other plans. The decrease in the ratio for 2022 is due to the large decrease in the market value of assets while the decrease in 2023 is due to the large increase in payroll.

SECTION II – IDENTIFICATION AND ASSESSMENT OF RISK

An actuarial liability leverage ratio of 5.0 means that if the System experiences a 2% loss on liabilities, the loss would be equivalent to 10% of payroll.
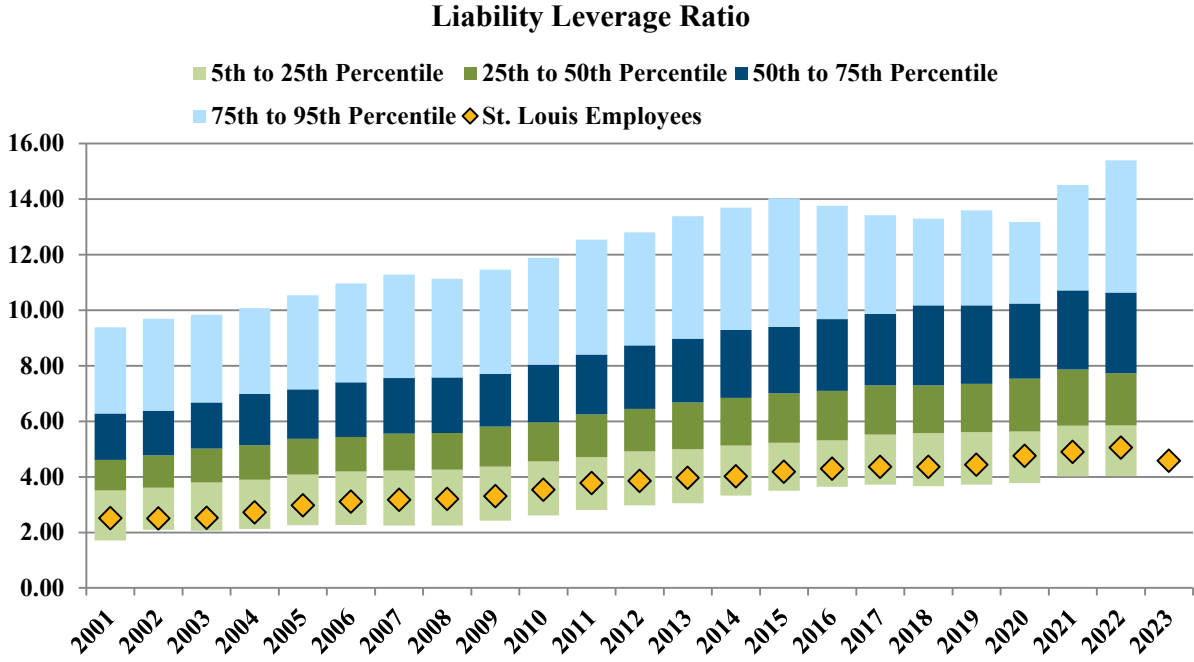
Liability Leverage Ratio

Survey Data from Public Plans Data as of 10/30/2023

The chart above shows the distribution from the 5th to 95th percentile of Actuarial Liability leverage ratios for the plans in the Public Plans Database. The gold diamond shows how the System compares.

The System's Actuarial Liability leverage ratio has historically been in the 5th to 25th percentile compared to other plans, meaning that the System may be less sensitive to risk compared to the plans in the Database. But as the Plan matures and more of the liability is due to inactive members, this ratio continues to increase. The ratio has increased from about 2.5 at the beginning of the period to a ratio of about 4.6 in 2023. The ratio declined slightly in 2023 because the percentage change in the payroll was greater than the change of the liabilities from year to year.

SECTION III – ASSETS

Pension Plan assets play a key role in the financial operation of the System and in the decisions the Trustees may make with respect to future deployment of those assets. The level of assets, the allocation of assets among asset classes, and the methodology used to measure assets will likely impact benefit levels, employer contributions, and the ultimate security of participants' benefits.

In this section, we present detailed information on the System assets including:

- Disclosure of the System assets as of September 30, 2022 and September 30, 3023;
- Statement of the changes in market values during the year;
- Development of the Actuarial Value of Assets;
- An assessment of investment performance; and
- A projection of the System's expected cash flows for the next ten years.

Disclosure

There are two types of asset values disclosed in this valuation, the market value of assets and the actuarial value of assets. The market value represents a "snap-shot" or "cash-out" value which provides the principal basis for measuring financial performance from one year to the next. Market values, however, can fluctuate widely with corresponding swings in the marketplace. As a result, market values are usually not as suitable for long-range planning as are the actuarial values of assets which reflect the smoothing of annual investment returns.

Table III-1 below discloses and compares each asset value as of September 30, 2022 and 2023.

Table III-1 Statement of Assets at Market Value as of September 30,			
Assets	**2022**	**2023**	**% Change**
Cash	$ 272,657	$ 893,489	227.70%
Receivables	1,305,234	1,343,461	2.93%
Temporary investments	17,370,010	18,088,325	4.14%
U.S Government Securities	34,416,076	56,875,533	65.26%
Corporate Bonds	29,595,829	0	(100.00%)
Global Bond Portfolio	36,602,002	19,942,185	(45.52%)
Stocks	284,451,659	305,708,249	7.47%
Domestic Bond Funds	22,267,947	17,480,155	(21.50%)
Managed Real Estate Fund	123,290,581	104,285,704	(15.41%)
Managed International Equity Funds	91,132,215	119,623,227	31.26%
Managed Hedge Fund of Funds	59,751,203	47,562,282	(20.40%)
Mutual Fund Small Cap Value	17,843,880	46,598,391	161.14%
Secured Bank Loan	43,078,260	49,025,246	13.81%
Accounts Payable	(587,600)	(1,022,320)	73.98%
Overpayment Employer Contribution	(2,803,351)	(260,079)	(90.72%)
Market Value of Assets	**$ 757,986,602**	**$786,143,848**	**3.71%**

SECTION III – ASSETS

Changes in Market Value

Table III-2 below shows the components of change between the market value of assets as of September 30, 2022 and September 30, 2023.

Table III-2 Changes in Market Values	
Value of Assets – September 30, 2022	**$ 757,986,602**
Additions	
Payments from Members	$ 76,931
Employer Contributions	39,337,287
Interest and Dividends	8,018,796
Investment Return	66,408,438
Total Additions	**$ 113,841,452**
Deductions	
Investment Expenses	$ 5,379,208
Benefit Payments	78,907,662
Administrative Expenses	1,397,336
Total Deductions	**$ 85,684,206**
Value of Assets – September 30, 2023	**$ 786,143,848**

SECTION III – ASSETS

Actuarial Value of Assets

Table III-3 below shows how the actuarial value of assets is developed. The actuarial value of assets method was initialized at market value as of October 1, 2005.

The actuarial value of assets represents a "smoothed" value developed by the actuary to reduce, or eliminate, erratic results that could develop from short-term fluctuations in the market value of assets. For this System, the actuarial value has been calculated by taking the market value of assets less 80% of the investment gain (loss) during the preceding year, less 60% of the investment gain (loss) during the second preceding year, less 40% of the investment gain (loss) during the third preceding year, and less 20% of the investment gain (loss) in the fourth preceding year. The investment gain (loss) is calculated by taking the difference between the expected value of assets based on an expected return of 7.25% for the year ended September 30, 2023 and the actual value of assets. If the actuarial value of assets is less than 80% or more than 120% of the market value, an adjustment is made to the actuarial value to bring the value within this corridor. The table below illustrates the calculation of the actuarial value of assets for the October 1, 2023 valuation.

Table III-3 Development of Actuarial Value of Assets		
Market value of assets at September 30, 2022	$	757,986,602
Employer Contributions		39,337,287
Payments from Members		76,931
Benefit payments		(78,907,662)
Administrative Expenses		(1,397,336)
Expected return at 7.25%		53,497,672
Expected Value at September 30, 2023	$	770,593,494
Actual Value at September 30, 2023		786,143,848
Investment (gain)/ loss	$	(15,550,354)

	Total Gain/(Loss)	Excluded Portion
Exclude 0% of 2019 gain/(loss)	$ (51,204,356)	$ 0
Exclude 20% of 2020 gain/(loss)	(15,075,167)	(3,015,033)
Exclude 40% of 2021 gain/(loss)	106,175,627	42,470,251
Exclude 60% of 2022 gain/(loss)	(188,582,285)	(113,149,371)
Exclude 80% of 2023 gain/(loss)	15,550,354	12,440,283
Total excluded gain/(loss) for AVA calculation		$ (61,253,870)

Market value of assets at September 30, 2023	$	786,143,848
Total gain/(loss) excluded		(61,253,870)
Actuarial value of assets at September 30, 2023	$	847,397,718
Actuarial value of assets as a % of Market value		107.79%

SECTION III – ASSETS

Investment Performance

The market value of assets (MVA) returned 9.36% during the plan year ending September 30, 2023, which is more than the assumed 7.25% return. A return of 3.20% was experienced on the actuarial value of assets (AVA), resulting in an actuarial loss for the year. Below, we show additional historical returns.

Table III-4 Historical Returns		
	MVA	**AVA**
2007	14.65%	10.17%
2008	-12.76%	5.85%
2009	-3.09%	1.52%
2010	10.11%	3.42%
2011	1.79%	1.25%
2012	16.95%	1.56%
2013	13.04%	7.99%
2014	9.63%	10.65%
2015	-3.79%	7.62%
2016	9.32%	7.58%
2017	11.55%	7.12%
2018	6.11%	6.31%
2019	1.17%	4.77%
2020	5.56%	6.36%
2021	20.88%	8.33%
2022	-13.68%	3.94%
2023	9.36%	3.20%

SECTION III – ASSETS

Projection of System's Future Cash Flows

Table III-5 Projection of System's Expected Cash Flows			
Year Beginning October 1,	**Benefit Payments and Administrative Expenses**	**Contributions**	**Net Cash Flow**
2023	$ 91,532,427	$ 44,094,668	$ (47,437,758)
2024	89,409,346	46,804,568	(42,604,779)
2025	92,049,907	49,257,806	(42,792,101)
2026	93,107,358	53,336,569	(39,770,788)
2027	94,403,251	54,412,531	(39,990,720)
2028	98,558,225	55,772,844	(42,785,380)
2029	99,463,836	57,167,165	(42,296,671)
2030	98,806,884	58,596,345	(40,210,539)
2031	103,125,392	60,061,253	(43,064,139)
2032	102,902,238	61,562,785	(41,339,453)

Expected contributions assume contribution rates as shown in the graph on page 6 and that payroll will increase at the actuarially assumed rate of 2.5% per year. Expected benefit payments are projected for the closed group as of October 1, 2023. Projecting any farther than ten years using a closed-group would not yield reliable predictions due to the omission of new hires.

SECTION IV – LIABILITIES

In this section, we present detailed information on the System liabilities including:

- **Disclosure** of the System liabilities as of October 1, 2022 and October 1, 2023, and

- Statement of **changes** in these liabilities during the year.

Disclosure

Several types of liabilities are calculated and presented in this report. Each type is distinguished by the people ultimately using the figures and the purpose for which they are using them.

- **Present Value of All Future Benefits:** Used for measuring all future System obligations, represents the amount of money needed today to fully fund all benefits of the System both earned as of the valuation date and those to be earned in the future by current plan participants, under the current plan provisions.

- **Actuarial Liability:** Calculated as of the valuation date as the present value of benefits allocated to service prior to that date. Effective October 1, 2015, the actuarial liability is determined using the Entry Age Normal method.

These liabilities are for funding purposes and are not appropriate for measuring the cost of settling plan liabilities by purchasing annuities or paying lump sums.

Table IV-1, which follows, discloses each of these liabilities for the current and prior valuations. With respect to each disclosure, a subtraction of the appropriate value of plan assets yields, for each respective type, a **net surplus** or an **unfunded liability**.

Table IV-1 Liabilities/Net (Surplus)/Unfunded		
	October 1, 2022	**October 1, 2023**
Present Value of Future Benefits		
Active Participant Benefits	$ 481,456,856	$ 501,785,130
Participants currently receiving payments	629,646,507	647,350,627
Participants with a deferred vested benefit	73,450,415	75,654,733
Present Value of Future Benefits (PVB)	**$ 1,184,553,778**	**$ 1,224,790,490**
Actuarial Liability		
Active Participant Benefits	$ 417,293,201	$ 429,996,621
Participants currently receiving payments	629,646,507	647,350,627
Participants with a deferred vested benefit	73,450,415	75,654,733
Actuarial Liability (AL)	**$ 1,120,390,123**	**$ 1,153,001,981**
Actuarial Value of Assets (AVA)	861,417,992	847,397,718
Net (Surplus)/Unfunded (AL – AVA)	**$ 258,972,131**	**$ 305,604,263**

SECTION IV – LIABILITIES

Changes in Liabilities

Each of the Liabilities disclosed in the prior table is expected to change at each valuation. The components of that change, depending upon which liability is analyzed, can include:

- Changes to the code that impact benefits
- Changes to the actuarial funding method
- Change to actuarial or investment assumptions
- Benefits accrued since the last valuation
- Passage of time which adds interest to the prior liability
- Benefits paid to retirees since the last valuation
- New hires since the last valuation
- Participants retiring, terminating, or dying at rates different than expected

Unfunded liabilities will change because of all of the above, and also due to changes in plan assets resulting from:

- Employer contributions different than expected
- Investment earnings different than expected
- A change in the method used to measure plan assets

In each valuation, we report on those elements of change that are of particular significance, potentially affecting the long-term financial outlook of the System. Below, we present key changes in liabilities since the last valuation.

In the table that follows, we show the components of change in the actuarial liability between October 1, 2022 and October 1, 2023.

Table IV-2	Actuarial Liability
Liabilities October 1, 2022	$ 1,120,390,123
Liabilities October 1, 2023	1,153,001,981
Liability Increase (Decrease)	32,611,858
Change Due to:	
Plan Amendments	0
Method Changes	0
Assumption Changes	0
Experience (Gain)/Loss	20,349,680
Benefits Accumulated and Other Sources	12,262,178

SECTION IV – LIABILITIES

The experience (gain)/loss shown in Table IV-2 can be broken down into more detail by the sources which contribute to the total actuarial (gain)/loss, as shown in Table IV-3 below.

Table IV-3 (Gain)/Loss by Source as of October 1, 2023		
COLA greater than expected	$	3,890,222
Inactive mortality greater than expected		(1,606,990)
Active decrements other than expected		(2,890,327)
Salary increases greater than expected for continuing actives		19,601,948
Update to sick leave balances		(379,355)
New entrants		1,427,517
Change to retiree DROP balances		(649,587)
Terminated vested participants deferring benefits		122,879
Participant service purchases		76,931
Miscellaneous changes		756,442
Experience (Gain)/Loss	**$**	**20,349,680**

SECTION V – CONTRIBUTIONS

In the process of evaluating the financial condition of any pension plan, the actuary analyzes the assets and liabilities to determine what level (if any) of contributions is needed to properly maintain the funding status of the System. Typically, the actuarial process will use a funding technique that will result in a pattern of contributions that are both stable and predictable.

For this System, the funding method employed as of the October 1, 2023 valuation is the **Entry Age Normal Actuarial Cost Method**. This method is used to determine the normal cost rate at which an average level percent of pay is required to fund the retirement benefits for all participants between their dates of hire and assumed dates of retirement. The EAN actuarial liability is the difference between the plan's total present value of future benefits and the present value of future normal costs. Effective October 1, 2015, an administrative expense rate of 0.30% of payroll was added to the normal cost and changed to 0.40% as of October 1, 2020. The difference between the Entry Age Normal actuarial liability and the actuarial value of assets is the unfunded actuarial liability.

The unfunded actuarial liability as of October 1, 2015 is amortized over a fixed 20-year period as a level percentage of payroll. Future gains and losses and changes in actuarial assumptions will be amortized in layers over separate 20-year periods.

Table V-1 below presents and compares the employer contribution rates for the System for this valuation and the prior one in terms of percentage of payroll.

Table V-1 Employer Contribution Rate (Percentage of Payroll)		
	Fiscal Year Ending 2023	**Fiscal Year Ending 2024**
Normal Cost Rate	5.56%	5.47%
Administrative Expense Rate	0.40%	0.40%
UAL Amortization Payment for City	11.09%	11.64%
Actuarially Determined Contribution Rate for City	17.05%	17.51%
Reduction in UAL Amortization Payment for Lawsuit Beneficiary Employers[1]	0.08%	0.07%
Actuarially Determined Contribution Rate for Lawsuit Beneficiary Employers	16.97%	17.44%

[1] See Appendix B for description of Lawsuit Beneficiary Employers

SECTION V – CONTRIBUTIONS

Table V-2 below presents and compares the employer contribution rates for the System for this valuation and the prior one in terms of dollars.

Table V-2 Employer Contribution in Dollars	Fiscal Year Ending 2023	Fiscal Year Ending 2024
Normal Cost and Expected Administrative Expenses	$ 13,234,544	$ 14,799,006
Amortization of Unfunded Actuarial Liability	24,572,424	29,295,662
Total Annual Contribution	$ 37,806,968	$ 44,094,668
Amount Actually Contributed	$ 39,337,287	TBD

SECTION V – CONTRIBUTIONS

The Unfunded Actuarial Liability (UAL) is amortized over layered 20-year periods beginning with the total UAL as of October 1, 2015. The amortization payment as a percent of payroll is different for City Employers and for Lawsuit Beneficiary Employers. Table V-3 shows the detailed calculation of the current year UAL amortization rates for the City and Lawsuit Beneficiary Employers.

Table V-3 Amortization Schedule							
	Date	Initial Amortization Period	Unamortized Amount	Remaining Amortization Period	Amortization Amount	Applicable Payroll	UAL Rate
2015 Initial Unfunded Actuarial Liability	10/1/2015	20	$ 161,868,638	12	$ 17,752,747		
2016 Actuarial (gain)/loss[1]	10/1/2016	20	(7,240,228)	13	(748,180)		
2017 Actuarial (gain)/loss[1]	10/1/2017	20	(3,353,333)	14	(328,387)		
2018 Actuarial (gain)/loss[1]	10/1/2018	20	(4,429,881)	15	(413,149)		
2019 Actuarial (gain)/loss[1]	10/1/2019	20	20,447,421	16	1,823,974		
2020 Assumption Change	10/1/2020	20	44,021,497	17	3,769,977		
2020 Actuarial (gain)/loss[1]	10/1/2020	20	14,855,589	17	1,272,224		
2021 Actuarial (gain)/loss[1]	10/1/2021	20	(10,805,435)	18	(891,339)		
2022 Actuarial (gain)/loss[1]	10/1/2022	20	37,004,715	19	2,948,868		
2023 Actuarial (gain)/loss[1]	10/1/2023	20	53,235,280	20	4,108,927		
Total UAL			$305,604,263		$29,295,662		
Unamortized Amounts from Library Settlement			$ (358,063)	12	$ (39,270)	$ 55,733,223 [2]	(0.07%)
Total without regard to Library Settlement			**$ 305,962,326**		**$29,334,932**	**$ 251,919,108** [3]	**11.64%**

[1] (Gain) or loss includes differences between actual and expected contributions
[2] Payroll for Lawsuit Beneficiary Employers
[3] Total payroll for all participating employers

SECTION VI – ACCOUNTING STATEMENT INFORMATION

GFOA Recommended Information

The Government Finance Officers Association (GFOA) maintains a checklist of items to be included in a public retirement system's Annual Comprehensive Financial Report (ACFR) in order to receive recognition for excellence in financial reporting. Although the Employees Retirement System does not issue an ACFR under GFOA guidelines, we have included certain schedules in this section for possible inclusion within the System's audited financial statements. These schedules are based on the funding actuarial liabilities.

- Table VI-1: Analysis of Financial Experience
- Table VI-2: Schedule of Funded Liabilities by Type
- Table VI-3: Schedule of Funding Progress

Table VI-1 Analysis of Financial Experience Gain and Loss in Unfunded Actuarial Liability During Years Ended September 30 Resulting from Differences Between Assumed Experience and Actual Experience						
	Gain (or Loss) for Year ending September 30,					
Type of Activity	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Investment Experience	$ (9,504,274)	$ (22,219,993)	$ (9,292,857)	$ 8,836,482	$(28,097,743)	$ (34,125,942)
Liability Experience	13,001,556	(872,215)	(6,489,657)	4,297,704	(12,395,698)	(20,349,680)
Gain (or Loss) During Year from Combined Experience	$ 3,497,282	$ (23,092,208)	$ (15,782,514)	$ 13,134,186	$(40,493,441)	$ (54,475,622)
Non-Recurring Gain (or Loss) Items	0	0	(45,356,360)	0	0	0
Composite Gain (or Loss) During Year	$ 3,497,282	$ (23,092,208)	$ (61,138,874)	$ 13,134,186	$(40,493,441)	$ (54,475,622)

SECTION VI – ACCOUNTING STATEMENT INFORMATION

Table VI-2 Schedule of Funded Liabilities by Type Aggregate Actuarial Liabilities for							
Actuarial Valuation Date October 1	Active Member Contributions	Retirees & Beneficiaries	Active Member Employer Financed Contributions	Actuarial Value of Reported Assets	Portion of Actuarial Liabilities Covered by Reported Assets		
	(1)	(2)	(3)		(1)	(2)	(3)
2023	$ 0	$ 723,005,360	$ 429,996,621	$ 847,397,718	100%	100%	29%
2022	0	703,096,922	417,293,201	861,417,992	100%	100%	38%
2021	0	673,034,165	421,654,051	867,593,392	100%	100%	46%
2020	0	648,506,475	435,618,987	841,450,402	100%	100%	44%
2019	0	589,148,288	426,306,456	830,686,015	100%	100%	57%
2018	0	563,779,679	432,763,603	831,005,302	100%	100%	62%
2017	0	540,747,179	449,883,176	818,839,562	100%	100%	62%
2016	0	517,161,890	456,981,189	797,664,391	100%	100%	61%
2015	0	501,123,197	453,997,444	770,006,025	100%	100%	59%
2014	0	494,664,459	417,314,687	737,967,928	100%	100%	58%
2013	0	475,937,321	413,511,258	685,397,323	100%	100%	51%

SECTION VI – ACCOUNTING STATEMENT INFORMATION

Table VI-3
Schedule of Funding Progress

Actuarial Valuation Date October 1	Actuarial Value of Assets (a)	Actuarial Liability (b)	Unfunded Actuarial Liability (b) - (a)	Funded Ratio (a) / (b)	Covered Payroll (c)	UAL as Percentage of Covered Payroll [(b) - (a)] / (c)
2023	$ 847,397,718	$1,153,001,981	$ 305,604,263	73.49%	$ 251,919,108	121.31%
2022	861,417,992	1,120,390,123	258,972,131	76.89%	221,930,584	116.69%
2021	867,593,392	1,094,688,216	227,094,824	79.25%	223,736,639	101.50%
2020	841,450,402	1,084,125,462	242,675,060	77.62%	228,162,770	106.36%
2019	830,686,015	1,015,454,744	184,768,729	81.80%	228,673,586	80.80%
2018	831,005,302	996,543,282	165,537,980	83.39%	228,447,481	72.46%
2017	818,839,562	990,630,355	171,790,793	82.66%	227,253,901	75.59%
2016	797,664,391	974,143,079	176,478,688	81.88%	226,907,701	77.78%
2015	770,006,025	955,120,641	185,114,616	80.62%	228,422,585	81.04%
2014	737,967,928	911,979,146	174,011,218	80.92%	227,039,143	76.64%
2013	685,397,323	889,448,579	204,051,256	77.06%	224,623,445	90.84%

APPENDIX A – MEMBERSHIP INFORMATION

Table of Plan Coverage			
	October 1, 2022	**October 1, 2023**	**% change**
Active Members in Valuation[1]			
Count	4,472	4,602	2.9%
Average Age	49.2	48.6	-1.2%
Average Service	11.6	10.8	-6.6%
Total Payroll	$ 221,930,584	$ 251,919,108	13.5%
Average Anticipated Payroll	$ 49,627	$ 54,741	10.3%
Total Active Vested Members	2,773	2,660	-4.1%
DROP Members in Valuation			
Count	361	334	-7.5%
Average Age (Current)	61.8	61.7	-0.1%
Average Age (at DROP Entry)	59.2	59.4	0.3%
Average Service	25.4	26.0	2.1%
Total DROP Account Balances	$ 17,853,162	$ 18,021,598	0.9%
Average DROP Account Balances	$ 49,455	$ 53,957	9.1%
Vested Terminated Members			1.2%
Count	2,635	2,666	
Average Age	52.2	52.2	0.0%
Average Monthly Benefit	$ 407	$ 413	1.5%
Pensioners			
Retirees	4,370	4,447	1.8%
Disabled Retirees	157	149	-5.1%
Total	4,527	4,596	1.5%
Average Age (Current)	73.2	73.3	0.2%
Average Age (at Retirement Date)	62.2	62.3	0.1%
Average Monthly Benefit	$ 1,148	$ 1,184	3.1%
Beneficiaries in Pay Status			
Number in Pay Status	522	520	-0.4%
Number with Deferred Benefits	0	0	N/A

[1]Includes Current DROP Members

APPENDIX A – MEMBERSHIP INFORMATION

Monthly Amount	Total	Retirees	Terminated Vested	Disability	Beneficiaries
Inactive Participants by Type and Monthly Benefit Amount					
Total	7,782	4,447	2,666	149	520
Under $500	3,851	1,666	1,981	40	164
$500-1,000	1,642	890	550	62	140
$1,000-1,500	832	626	92	30	84
$1,500-2,000	585	476	30	15	64
$2,000-2,500	325	288	6	2	29
$2,500-3,000	214	196	7	0	11
$3,000-3,500	95	85	0	0	10
$3,500-4,000	64	61	0	0	3
$4,000-4,500	35	31	0	0	4
$4,500-5,000	41	37	0	0	4
$5,000-5,500	28	25	0	0	3
$5,500-6,000	22	21	0	0	1
$6,000-6,500	15	14	0	0	1
$6,500 & over	33	31	0	0	2

APPENDIX A – MEMBERSHIP INFORMATION

Status Reconciliation									
	Active	**Leave of Absence**	**DROP**	**Disabled**	**Retired**	**Beneficiary**	**Terminated Vested**	**Deferred Beneficiary**	**Total**
Participant Count as of October 1, 2022	**4,102**	**9**	**361**	**157**	**4,370**	**522**	**2,635**	**0**	**12,156**
New hires	746								746
Leave of Absence	(2)	2							0
Rehires	32	(2)					(8)		22
Enter DROP	(64)		64						0
Return from DROP	50		(50)						0
Term Vested	(161)	(1)					162		0
Retired	(119)		(39)		260		(102)		0
Disabled	(1)	(1)		4			(2)		0
Deceased (with Beneficiary)	(4)			(2)	(26)	32			0
Deceased (without Beneficiary)	(7)		(2)	(9)	(160)	(28)	(18)		(224)
Transfer Out							(2)		(2)
Term Not Vested	(310)	(2)							(312)
Benefits Expired						(6)			(6)
Status Correction	1			(1)	3		1		4
Net Change	161	(4)	(27)	(8)	77	(2)	31	0	228
Participant Count as of October 1, 2023	**4,263**	**5**	**334**	**149**	**4,447**	**520**	**2,666**	**0**	**12,384**

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

A. Actuarial Assumptions

1. Mortality Rates:

Active: 135% of the Pub-2010 General Employee below-median income mortality table [*PubG-2010(B) Employee*] for males and 155% for females projected with generational mortality improvements from 2010 using Scale MP-2019.

Healthy: 125% of the Pub-2010 General Retiree below-median income mortality table [*PubG-2010(B) Healthy Retiree*] for males and 120% for females projected with generational mortality improvements from 2010 using Scale MP-2019.

Disabled: 120% of the Pub-2010 Non-Safety Disabled Retiree mortality table [*PubNS-2010 Disabled Retiree*] for males and 110% for females projected with generational mortality improvements from 2010 using Scale MP-2019.

The table below shows the probability of death at sample ages with the mortality table described above projected to the year 2023. A generational table is projected forward each year to account for continuous mortality improvements.

	Healthy Employees (%)		Healthy Retirees (%)		Disabled Mortality (%)	
Age	Male	Female	Male	Female	Male	Female
20	0.0592	0.0226	0.0548	0.0175	0.4708	0.2499
25	0.0675	0.0233	0.0625	0.0180	0.4790	0.2828
30	0.1004	0.0409	0.0930	0.0317	0.6989	0.4784
35	0.1383	0.0649	0.1280	0.0503	0.9070	0.7046
40	0.1708	0.0878	0.1581	0.0680	1.1018	0.9230
45	0.2034	0.1119	0.1883	0.0866	1.4436	1.2340
50	0.2755	0.1580	0.8438	0.4803	2.0371	1.7052
55	0.4149	0.2509	1.0817	0.5814	2.7061	2.1329
60	0.6453	0.3899	1.3886	0.6761	3.3109	2.3196
65	0.9225	0.5683	1.6382	0.8046	3.9033	2.4978
70	1.2824	0.8677	2.4166	1.2739	4.7312	3.1543
75	1.9287	1.4297	3.8844	2.2202	6.3375	4.6346
80	3.0552	2.4281	6.6233	4.0331	9.2782	7.3066
85	12.4088	9.6992	11.4897	7.5090	13.8989	11.4205
90	20.3084	17.8159	18.8041	13.7929	21.2794	16.2531
95	29.4184	28.0988	27.2393	21.7539	30.0462	23.4160
100	41.4402	41.7617	38.3705	32.3316	41.7315	34.2831

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

2. **Disability Rates before Retirement:**

	Disability (%)	
Age	Male	Female
20	0.0200	0.0200
25	0.0200	0.0200
30	0.0200	0.0200
35	0.0200	0.0200
40	0.0560	0.0346
45	0.1000	0.1074
50	0.3528	0.1802
55	0.5000	0.2530
60	0.5000	0.3258

3. **Withdrawal Rates before Retirement:**

Creditable Service	Withdrawal (%)	Creditable Service	Withdrawal (%)
0	22.00	13	4.50
1	18.00	14	4.00
2	16.00	15	3.50
3	14.00	16	3.00
4	12.00	17	2.50
5	11.00	18	2.00
6	10.00	19	2.00
7	9.00	20	2.00
8	8.00	21	2.00
9	7.00	22	2.00
10	6.00	23	2.00
11	5.50	24	2.00
12	5.00	25+	1.25

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

4. **Retirement Rates:**

Age	Retirement Rate (%)	Age	DROP Rate (%)
50 and under	2.00	50 and under	12.50
51	2.00	51	12.50
52	2.00	52	12.50
53	2.00	53	12.50
54	2.00	54	12.50
55	4.00	55	12.50
56	4.00	56	12.50
57	5.00	57	12.50
58	5.00	58	12.50
59	5.00	59	12.50
60	6.00	60	12.50
61	10.00	61	7.50
62	15.00	62	7.50
63	15.00	63	7.50
64	15.00	64	7.50
65	30.00	65	7.50
66	25.00	66	2.00
67	25.00	67	2.00
68	25.00	68	2.00
69	25.00	69	2.00
70	100.00	70	100.00

In addition, in the first year that a participant satisfies the requirements under the "Rule of 85," the DROP rate is assumed to be 70% if the age in the first year of eligibility is 56 or younger, 55% for ages 57 to 62, 30% for ages 63 to 65, and 15% for ages greater than 65 (100% at age 70).

5. **Retirement Age for Inactive Vested Participants**

For members who terminate employment with 30 or more years of creditable service or are eligible for a Rule of 85 Pension, immediate commencement of benefits is assumed. All others are assumed to retire at age 62.

6. **DROP Participants**

Participants in the DROP are assumed to remain in the DROP for 5 years. Interest to the DROP account is assumed to be credited at 6% per annum for those participants who enter the DROP after January 21, 2003. 50% of those participants electing DROP are expected to return to active employment for three years before retiring.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

7. **Unknown Data for Participants**

   Same as those exhibited by participants with similar known characteristics. For inactive vested participants with unknown benefit amounts, $250 per month is assumed.

8. **Rehires**

   No explicit assumption or load

9. **Sick Leave**

   Sick leave may be used to increase either Final Average Compensation, Creditable Service, or both. Starting with the October 1, 2010 valuation, the actual unused credited sick leave hours on file were used in the valuation. Effective in July 2010, the accumulation of unused sick leave hours that can be used for benefit purposes was frozen.

10. **Percent Married**

    80% for all participants

11. **Age of Spouse**

    Females (or males) are three years younger (or older) than their spouses.

12. **Net Investment Return**

    7.25% per year, net of investment expenses

    An effective interest rate of 5.61% compounded annually was used when calculating the Low-Default Risk Obligation Measure (LDROM) to meet the new requirements under Actuarial Standard of Practice No. 4. This was based on the FTSE Pension Liability Yield Curve published as of September 30, 2023.

13. **Administrative Expenses**

    0.40% of payroll

14. **Cost-of-Living Adjustment**

    2.5% per year for 10 years and 0% thereafter

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

15. Salary Increases

Varies by service, ranging from 2.50% to 4.55%.

Creditable Service	Salary Increase (%)	Creditable Service	Salary Increase (%)
0	4.55	13	3.07
1	4.26	14	3.02
2	4.19	15	2.97
3	3.98	16	2.92
4	3.83	17	2.87
5	3.69	18	2.82
6	3.49	19	2.77
7	3.44	20	2.72
8	3.33	21	2.67
9	3.27	22	2.62
10	3.23	23	2.57
11	3.17	24	2.52
12	3.12	25+	2.50

16. Increases in Social Security Table Wage Base

2.5% per year

17. Increase in Section 415 and Section 401(a)(17) limits

2.5% per year

18. Rationale for actuarial assumptions

The actuarial assumptions were adopted by the Board of Trustees to better conform with future expectations based on the recommendations made in an actuarial experience study covering the years 2014 through 2019, which was presented to the Board on April 28, 2020. The rationale for the actuarial assumptions is included within the experience study report.

The combined effect of the assumptions in aggregate is expected to have no significant bias.

19. Changes in actuarial assumptions since last valuation

None

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

B. Actuarial Methods

1. **Actuarial Value of Assets**

   The market value of assets less unrecognized returns in each of the last five years, but no earlier than October 1, 2005. Initial unrecognized return is equal to the difference between the actual market return and expected market return and is recognized over a five-year period. The actuarial value is further adjusted, if necessary, to be within 20% of the market value. The actuarial asset value was initialized at the market value as of October 1, 2005.

2. **Actuarial Cost Method**

   The cost method for valuation of liabilities used for this valuation is the Entry Age Normal (EAN) method. This method is used to determine the normal cost rate at which an average level percent of pay is required to fund the retirement benefits for all Participants between their dates of hire and assumed dates of retirement. The EAN actuarial liability is the difference between the plan's total present value of future benefits and the present value of future normal costs. The unfunded actuarial liability is the difference between the actuarial liability and the actuarial value of assets.

3. **Amortization Method**

   The unfunded actuarial liability as of October 1, 2015, is amortized over a fixed 20-year period as a level percentage of payroll. Future gains and losses and changes in actuarial assumptions will be amortized in layers over separate 20 year periods.

   To reflect the settlement between the Library, the Board of Trustees, and the City of St. Louis, two Unfunded Accrued Liability Amortization rates are calculated. The Library, Zoo, Art Museum, Tower Grove Park, Taxicab Commission, and Mental Health Board, collectively called the "Lawsuit Beneficiary Employers", have a reduced UAL Amortization rate to reflect the payments received due to the settlement as of the valuation date. First, the UAL amortization payment is determined for the combined plan (base payment). Second, the value of settlement payments made by the City are set up as gain bases and the Lawsuit Beneficiary Employers have a reduction in the contribution rate determined from the payment on these gain bases and their projected payroll. The City's UAL amortization payment is determined only on the base payment. The Lawsuit Beneficiary Employers' UAL amortization payment is the base payment minus the amortization of the gain bases that result from settlement payments.

APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

4. Valuation Software

Cheiron utilizes ProVal, an actuarial valuation software leased from Winklevoss Technologies (WinTech) to calculate liabilities and project benefit payments. We have relied on WinTech as the developer of ProVal. We have examined the reasonableness of the input data and assumptions, reviewed sample calculations for accuracy, reconciled the actuarial gain loss, and find the aggregate results reasonable and appropriate. We are not aware of any material inconsistencies, unreasonable output resulting from the aggregation of assumptions, material limitations, or known weaknesses that would affect this actuarial valuation.

Projections in this valuation were developed using P-scan, our proprietary tool for the intended purpose of developing projections. The projections shown in this report cover multiple individual scenarios and the variables are not necessarily correlated. We are not aware of any material inconsistencies, unreasonable output resulting from the aggregation of assumptions, material limitations, or known weaknesses that would affect the projections shown in this report.

5. ASOP No. 4 Disclosure

The actuarially determined contribution (ADC) in Tables V-1 and V-2 is a reasonable actuarially determined contribution in accordance with Actuarial Standard of Practice (ASOP) No. 4. The actuarial methods used to determine the reasonable ADC have been selected to balance benefit security, intergenerational equity and stability of contributions. The selection of the actuarial methods has taken into account the demographics of plan members, the funding goals and objectives of the City, and the need to accumulate assets to make benefit payments when due.

6. Changes in Actuarial Methods Since Last valuation

None

APPENDIX C – SUMMARY OF PLAN PROVISIONS

1. **Plan Year**

   October 1 through September 30

2. **Final Average Compensation**

   One-half the sum of:

   (a) The total compensation earned during the last two highest consecutive years of Creditable Service prior to termination (subject to the Section 401(a)(17) limit); and

   (b) The balance of sick leave pay as of the date of retirement less sick leave hours paid upon termination and less sick leave hours considered as Creditable Service. Said balance cannot exceed 25% of a member's total sick leave pay as of the date of retirement. The amount of credited sick leave was frozen on July 17, 2010.

3. **Benefit Compensation Base**

   Amount of annual compensation with respect to which old age and survivor's insurance benefits would be provided to the member under the Social Security Act in effect on the date the Benefit Compensation Base is determined calculated when the member terminates employment.

4. **Normal Retirement**

   Age Requirement: 65

   Service Requirement: Five years of Creditable Service.

   Amount: The product of:
   (a) 1.30% of Final Average Compensation up to the Benefit Compensation Base, plus 2.05% of Final Average Compensation in excess of the Benefit Compensation Base, and

   (b) Creditable Service:
   Minimum $200 per month for retirees with 12 or more years of creditable service.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

5. Rule of 85 Retirement

Age/Service
Requirement: Sum of age and Creditable Service at date of termination equals or exceeds 85.

Amount: The product of:
(a) 1.30% of Final Average Compensation up to the Benefit Compensation Base, plus 2.05% of Final Average Compensation in excess of the Benefit Compensation Base, and
(b) Creditable Service.

6. Early Retirement

Age/Service
Requirement: Age 60 with five years of Creditable Service; or age 55 with 20 years of Creditable Service; or any age with 30 years of Creditable Service.

Amount: Normal retirement amount reduced by 1/3% for each month benefit begins before age 65.

7. Disability

Age Requirement   None

Service Requirement   Five years of Creditable Service and an active employee at disablement.

Amount   Normal retirement amount based on Creditable Service and Final Average Compensation at disability, payable immediately.

8. DROP (Deferred Retirement Option Plan)

Members who have achieved eligibility for retirement can continue active employment and defer receipt of their retirement allowance for a period not to exceed five years. During the DROP period, the member's retirement allowance will be paid directly into a separate account.

Service during the DROP period shall not be counted as Creditable Service, nor shall it count toward determination of retirement allowance. A member's DROP account shall not be adjusted for any cost-of-living increases during participation in the DROP. No member returning to non-DROP status shall make any withdrawal from his/her DROP account until after termination of employment.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

The account balance is credited with interest annually. In no event does the total account balance exceed the accumulated value of five-years-payments with interest.

The annuity awarded upon full termination and subsequent benefit receipt reflects the unused sick-leave conversion to Creditable Service and/or Final Average compensation. During participation in the DROP, the annual deposit to the account does not reflect any conversion of unused sick leave as each participant continues to accrue sick leave hours. The unused credited sick leave hours were frozen as of July 17, 2010.

9. **Vesting**

   Age Requirement: None

   Service Requirement: Five years of Creditable Service

   Amount: Normal or early service retirement amount

10. **Spouse Pre-Retirement Death Benefit**

    Age Requirement: None

    Service Requirement: Five years of Creditable and an active employee

    Amount: If married, 100% of the benefit the employee would have received had he or she retired the day before he or she died and elected the joint and 100% survivor option. If the employee died prior to eligibility for early service retirement, the spouse's benefit is deferred to the employee's earliest retirement date.

                           Death benefits may also be payable to members who have terminated employment. The costs of those benefits are paid for by the reduction of the accrued benefit payable to the inactive vested participant.

11. **Post-Retirement Death Benefit**

    If married, the employee and spouse may elect to have pension benefits paid in the form of a 100% joint and survivor annuity. A member may also elect a ten year certain and life equivalent form of benefit. If any one of these options is elected, the benefit amount otherwise payable is reduced to reflect the coverage. If not elected, benefits are payable for the life of the employee without reduction.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

12. Cost-of-Living Adjustment (COLA)

Based on the change in the Consumer Price Index (CPI) for the fiscal year, subject to a maximum increase of 5.0% per year with a cumulative percentage increase (equal to the sum of the annual percentage increases) limited to 25%. If the increase in CPI is less than 1.0%, no adjustment is made. If the change is a decrease, the cost-of-living adjustment shall be zero unless the decrease is 5.0% or more. Adjustments begin on the second January 1 after payments begin.

13. Creditable Service

Number of years and completed months of service during which the member receives compensation after April 1, 1960. Creditable Service for employment prior to April 1, 1960 is granted only if the member was an employee of an employer of the System on April 1, 1960. Unused credited sick leave shall be considered as Creditable Service provided the member does not receive payment for the sick leave. The amount of credited sick leave was frozen on July 17, 2010.

14. Membership

Immediate upon employment

15. Section 415 limit

$265,000, effective January 1, 2023

16. Section 401(a)(17) limit

$330,000, effective January 1, 2023

17. Changes Since Last Valuation

None