Consolidated Judicial Retirement System of North Carolina

Principal Results of Actuarial Valuation as of December 31, 2022

October 26, 2023, Board of Trustees Meeting

Michael Ribble, FSA, EA, MAAA, FCA
Elizabeth Wiley, FSA, EA, MAAA, FCA

Valuation results

Net actuarial gain or loss

Actuarial Value of Assets	Actuarial Accrued Liability	**Net Actuarial Gain or Loss**	Funded Ratio	Employer Contributions

The table below provides a reconciliation of the prior year's unfunded actuarial accrued liability to the current year's unfunded actuarial accrued liability.

(in millions)	
Unfunded actuarial accrued liability (UAAL) as of 12/31/2021	$ 129.4
Normal cost and administrative expense during 2022	15.4
Reduction due to actual contributions during 2022	(42.1)
Interest on UAAL, normal cost, and contributions	8.1
Asset (gain) / loss	13.7
Actuarial accrued liability (gain) / loss	28.8
Impact of assumption changes	0
Impact of benefit changes	2.1
Unfunded actuarial accrued liability (UAAL) as of 12/31/2022	$ 155.4

During 2022, the UAAL increased by $26.0 million.

The increase was primarily due to an asset loss of $13.7 million and demographic experience loss of $28.8 million, resulting primarily from higher-than-expected salary increases for continuing active members as well as losses attributable to new entrants.

A detailed summary of the net actuarial gain or loss is provided in Section 4.

Valuation results

Employer contributions

Actuarial Value of Assets	Actuarial Accrued Liability	Net Actuarial Gain or Loss	Funded Ratio	Employer Contributions

The table below provides a reconciliation of the actuarially determined employer contribution.

Fiscal year ending June 30, 2023 Preliminary ADEC (based on December 31, 2021 valuation)	32.84%
Impact of Benefit Changes*	2.44%
Fiscal year ending June 30, 2023 Final ADEC	35.28%
Change Due to Anticipated Reduction in UAAL**	(1.19%)
Change Due to Demographic (Gain)/Loss	2.50%
Change Due to Investment (Gain)/Loss	2.02%
Change Due to Contributions Less (Greater) than ADEC	(1.11%)
Impact of Assumption Changes	0.00%
Impact of Benefit Changes	0.30%
Impact of Direct Rate Smoothing	0.60%
Reversal of one-time Legislative Costs	(2.44%)
Fiscal year ending June 30, 2025 Preliminary ADEC (based on December 31, 2022 valuation)	35.96%

*Due to the one-time pension supplement to be paid by November 2023.

**Amortization of the UAAL included a fresh-start 9-year amortization for the December 31, 2009, valuation with the first payment effective July 1, 2011. However, the Appropriations Act of 2011 changed the period over which the UAAL is amortized from nine years to 12 years, retroactive to July 1, 2011, as implemented in the December 31, 2010, valuation.

A detailed summary of the actuarially determined employer contribution rates is provided in Section 5.

The change in rate due to investment loss is based on the actuarial value of asset return of 4.53%, which was less than the 6.50% assumed return.

The change in rate due to demographic loss was largely due to higher-than-expected salary increases for continuing active members as well as losses attributable to new entrants.

Key takeaways

- The actuarial valuation is performed each year to replace the estimates the actuary assumed for the prior valuation with the actual events that happened. This past year, as expected, some of the assumptions used in the prior valuation were not realized. Key results of the December 31, 2022 valuation were:
  - Market value returns of (10.39)% compared to 6.50% assumed at the beginning of the year
  - Liabilities $28.8 million higher than anticipated as of December 31, 2022
  - Continuation of direct-rate smoothing of the change in the employer contribution rate due to the changes in assumptions and methods over a 5-year period beginning with the December 31, 2020 valuation
  - Recent legislation signed into law since the prior valuation
    - One-time supplement payment for CJRS payees of 4% of their annual retirement allowance, payable by November 2023

Key takeaways (continued)

- When compared to the December 31, 2021 valuation, the above resulted in:
  - Lower funded ratio (82.3% in the December 31, 2022 valuation compared to 84.4% in the December 31, 2021 valuation)
  - Higher actuarially determined employer contribution rate (35.96% for fiscal year ending June 30, 2025 compared to the 32.84% for fiscal year ending June 30, 2024, disregarding the cost of one-time benefits)

Key takeaways (continued)

- CJRS is well funded compared to its peers. This is due to:
  - Stakeholders working together to keep CJRS well-funded since inception
  - A history of appropriating and contributing the recommended contribution requirements
  - Assumptions that in aggregate are more conservative than peers
  - A funding policy that aggressively pays down unfunded liability over a 12-year period
  - An ad hoc cost-of-living adjustment that supports the health of the system
  - Modest changes in benefits when compared to peers
- Continued focus on these measures will be needed to maintain the solid status of CJRS well into the future.

Certification

Future actuarial results may differ significantly from the current results presented in this report due to such factors as the following: fund experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; and changes in plan provisions or applicable law. Such changes in law may include additional costs resulting from future legislated benefit improvements or cost-of-living pension increases or supplements, which are not anticipated in the actuarial valuation. Because of limited scope, Buck performed no analysis of the potential range of such future differences, except for some limited analysis in financial projections or required disclosure information.

The purpose of this presentation is to provide a summary of the actuarial valuation results to the Board at the October 26, 2023 meeting attended by the actuaries. Use of this report for any other purposes may not be appropriate and may result in mistaken conclusions because of failure to understand applicable assumptions, methods, or inapplicability of this presentation for that purpose. This presentation should not be provided without a copy of the full valuation report. Because of the risk of misinterpretation of actuarial results, you should ask Buck, A Gallagher Company (Buck) to review any statement you wish to make on the results contained in this presentation. Buck will not accept any liability for any such statement made without prior review

This presentation is considered part of the annual actuarial valuation report. Please see below for full description of data, actuarial assumptions and methods, plan provisions, and other applicable disclosures.

We meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained in this report. This report has been prepared in accordance with all applicable Actuarial Standards of Practice, and we are available to answer questions about it.

Michael A. Ribble, FSA, EA, MAAA, FCA

Elizabeth A. Wiley, FSA, EA, MAAA, FCA

Appendix I

Supplemental Information

Valuation input

Membership data

Membership Data	Asset Data	Benefit Provisions	Assumptions	Funding Methodology

The table below provides a summary of the membership data used in this valuation compared to the prior valuation.

Number as of	12/31/2022	12/31/2021
Active members	581	569
Terminated members and survivors of deceased members entitled to benefits but not yet receiving benefits	39	31
Terminated non-vested members and survivors of deceased members entitled to a refund of contributions	21	26
Retired members and survivors of deceased members currently receiving benefits	816	792
Total	1,457	1,418

A detailed summary of the membership data used in this valuation is provided in Section 2 and Appendix A.

The number of active members has increased by 2.1% from the previous valuation date.

An increase in active members results in more members accruing benefits under the system.

The number of retired members and survivors of deceased members currently receiving benefits increased by 3.0% from the previous valuation date.

The increase in retiree population is consistent with expectations.

Valuation input

Market value

Membership Data	Asset Data	Benefit Provisions	Assumptions	Funding Methodology

The table below provides details of the Market Value of Assets for the current and prior year's valuations.

Asset data as of	12/31/2022	12/31/2021
Beginning of year market value of assets	$ 743,543,527	$ 695,354,777
Employer contributions	36,142,442	29,344,457
Employee contributions	6,007,299	5,210,339
Benefit payments other than refunds	(55,232,909)	(52,663,696)
Refunds	(11,874)	(31,907)
Administrative expenses	(45,234)	(34,873)
Investment income	(76,535,571)	66,364,430
Net increase / (decrease)	(89,675,847)	48,188,750
End of year market value of assets	$ 653,867,680	$ 743,543,527
Estimated net investment return on market value	-10.39%	9.67%

A detailed summary of the market value of assets is provided in Section 3.

CJRS assets are held in trust and are invested for the exclusive benefit of plan members.

For 2022, incoming contributions covered over 76% of the outgoing benefit payments and administrative expenses.

Over the long term, benefit payments and administrative expenses not covered by contributions are expected to be covered with investment income, illustrating the benefits of following actuarial pre- funding since inception.

Valuation results

Employer contributions and benefit enhancements

Actuarial Value of Assets	Actuarial Accrued Liability	Net Actuarial Gain or Loss	Funded Ratio	**Employer Contributions**

The table below provides a history of the actuarially determined employer contribution and the corresponding appropriated rate.

Valuation Date	Fiscal Year Ending	Normal Rate*	Accrued Liability Rate	Change due to Legislation**	Final ADEC	Appropriated Rate
12/31/2022	06/30/2025	13.21%	22.75%	N/A	N/A	N/A
12/31/2021	06/30/2024	14.16%	18.68%	2.44%	35.28%	35.28%
12/31/2020	06/30/2023	13.02%	23.99%	2.64%	39.65%	39.65%
12/31/2019	06/30/2022	17.59%	21.11%	1.32%	40.02%	40.02%
12/31/2018	06/30/2021	17.43%	19.01%	0.00%	36.44%	36.44%

*Includes Death Benefit rate.

**The change due to legislation for the contribution for fiscal year ending June 30, 2024 provided for a one-time supplement equal to 4% of the annual retirement allowance payable by November 2023.The change due to legislation for the contribution for fiscal year ending June 30, 2023 provided for a one-time supplement equal to 4% of the annual retirement allowance payable in October 2022. The change due to legislation for the contribution for fiscal year ending June 30, 2022 provided for a 2% one-time supplement payable in December 2021.

A detailed summary of the actuarially determined employer contribution rates is provided in Section 5.

The appropriated rate for the fiscal year ending June 30, 2024 is 35.28%.

The preliminary ADEC for the fiscal year ending June 30, 2025 is 35.96%.

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Consolidated Judicial Retirement System of North Carolina

Report on the Actuarial Valuation Prepared as of December 31, 2022

October 2023

110 West Berry Street
Suite 1300
Fort Wayne, IN 46802

October 13, 2023

Board of Trustees
Consolidated Judicial Retirement System
of North Carolina
3200 Atlantic Avenue
Raleigh, NC 27604

Members of the Board:

We submit herewith our report on the annual valuation of the Consolidated Judicial Retirement System of North Carolina (referred to as "CJRS" or the "Judicial Plan") prepared as of December 31, 2022. The report has been prepared in accordance with North Carolina General Statute 135-50 through 135-75. Information contained in our report for plan years from December 31, 2017, to December 31, 2020, is based on valuations performed by the prior actuarial firm.

The primary purpose of the valuation report is to determine the required member and employer contribution rates, to describe the current financial condition of CJRS, and to analyze changes in such condition. Use of this report for any other purposes or by anyone other than North Carolina Retirement Systems Division (RSD) or Department of State Treasurer staff may not be appropriate and may result in mistaken conclusions because of failure to understand applicable assumptions, methods, or inapplicability of the report for that purpose. The attached pages should not be provided without a copy of this cover letter. Because of the risk of misinterpretation of actuarial results, you should ask Buck, A Gallagher Company (Buck) to review any statement you wish to make on the results contained in this report. Buck will not accept any liability for any such statement made without prior review.

The valuation is based upon membership data and financial information as furnished by RSD and the Financial Operations Division and as summarized in this report. Although we reviewed for reasonableness and consistency with the prior valuation, these elements have not been audited by Buck and we cannot certify as to the accuracy and completeness of the data supplied. The valuation is also based on benefit and contribution provisions as presented in this report. If you have reason to believe that the plan provisions are incorrectly described that important plan provisions relevant to this valuation are not described, or that conditions have changed since the calculations were made, you should contact the authors of this actuarial report prior to relying on this information.

The valuation is further based on the actuarial valuation assumptions, approved by the Board of Trustees, as presented in this report. We believe that these assumptions are reasonable and comply with the Actuarial Standards of Practice ("ASOPs") 27 and 35. We prepared this valuation in accordance with the requirements of this standard and in accordance with all applicable ASOPs.

The assumptions used for the December 31, 2022 actuarial valuation are based on the experience study prepared as of December 31, 2019 and adopted by the Board of Trustees on January 28, 2021. All assumptions are discussed annually with the appropriate parties, and actuarial gain/loss experience is reviewed during each valuation, to see if any changes are needed. The economic assumptions with respect to investment yield, salary increase, and inflation have been based upon a review of the existing portfolio structure as well as recent and anticipated experience. All assumptions represent an estimate of future experience.

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 Board's selection of the investment return assumption, 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 the investment return assumption 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 actuaries' analysis, including consistency with other assumptions used in the valuation, the percentiles generated by the spreadsheet described above and review of actuarial gain/loss experience, the actuaries believe the assumptions, in the actuaries' professional judgment, are reasonable for the purpose of the measurement.

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 may be 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. In various places in the report the results also show funded ratios and unfunded liabilities based upon varying sets of assumptions as well as market values of assets as that is required for certain disclosure information required per accounting rules or statutes. Where this has been done it has been clearly indicated.

Actuarial Standard of Practice No. 56 ("ASOP 56") provides guidance to actuaries when performing actuarial services with respect to designing, developing, selecting, modifying, using, reviewing, or evaluating models. In addition to the spreadsheet model discussed above, 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 accounting 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 accounting rules to the liabilities derived 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 whereby the results of the liability calculations are checked using detailed sample output, changes from year to year are summarized by source, and significant deviations from expectations are investigated. Other accounting outputs and the internal model are similarly reviewed in detail and at a high level for accuracy, reasonability, and consistency with prior results. Buck also reviews the third-party model when significant changes are made to the software. The review is performed by experts within the company who are familiar with applicable accounting 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 the company who are familiar with the details of the required changes.

Future actuarial results may differ significantly from the current results presented in this report due to such factors as the following: fund experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; and changes in plan provisions or applicable law. Such changes in law may include additional costs resulting from future legislated benefit improvements or cost-of-living pension increases or supplements, which are not anticipated in the actuarial valuation. Because of limited scope, Buck performed no analysis of the potential range of such future differences, except for some limited analysis in financial projections or required disclosure information.

This report was prepared under our supervision and in accordance with all applicable Actuarial Standards of Practice. We are Fellows of the Society of Actuaries, Enrolled Actuaries, Members of the American Academy of Actuaries, and Fellows of the Conference of Consulting Actuaries. We meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. We are available to discuss this report with you at your convenience.

Respectfully submitted,

Michael A. Ribble, FSA, EA, MAAA, FCA
Principal, Retirement Actuary
Buck, A Gallagher Company

Elizabeth A. Wiley, FSA, EA, MAAA, FCA
Senior Consultant, Retirement Actuary
Buck, A Gallagher Company

Table of Contents

Executive Summary

Overview

The North Carolina Retirement Systems Division (RSD) was established in 1941 to provide retirement benefits for public servants in the State of North Carolina. Today, under the management of the Department of State Treasurer, RSD administers seven public pension plans (defined benefit plans), three supplemental retirement plans (voluntary defined contributions plans), a health trust fund, a disability income plan, death benefit funds and a number of other benefit programs. As of December 31, 2022, the RSD defined benefit plans cover over one million current and prior public servants in the state of North Carolina. During the fiscal year ending June 30, 2023, RSD paid nearly $7.5 billion in pensions to more than 350,000 retirees and as of June 30, 2023, RSD's assets were valued at over $114 billion.

Under the supplemental retirement plans, the amount of contributions in any given year is defined by law. The amount of benefits derived is dependent on the investment returns the individual achieves. Conversely, under the pension plans, the amount of the benefit paid to a member upon retirement, termination, death, or disability is defined by law. The amount of contributions needed to fund these benefits cannot be known with certainty. In North Carolina, like other states, these contributions are paid during a public servant's career so that upon retirement, termination, death, or disability, there are funds available to pay these benefits. These amounts are determined through an actuarial valuation. Actuarial valuations are performed for each of the pension plans administered by RSD and the results are contained in actuarial valuation reports like this.

In 1985, the Consolidated Judicial Retirement System (referred to as "CJRS" or the "Judicial Plan") was established. CJRS provides benefits to the elected judges and justices, district attorneys, clerks of superior court of the general court of justice and public defenders. As of December 31, 2022, CJRS has about $654 million in assets and over 1,400 members. This actuarial valuation report is our annual analysis of the financial health of CJRS. This report, prepared as of December 31, 2022, presents the results of the actuarial valuation of CJRS.

Purpose

An actuarial valuation is performed on CJRS annually as of the end of the calendar year. The actuary determines the amount of contributions to be made to CJRS during each member's career that, when combined with investment return, will be sufficient to pay for retirement benefits.

In addition, the annual actuarial valuation is performed to:

- Determine the progress on funding CJRS,
- Explore why the results of the current valuation differ from the results of the valuation of the previous year, and
- Satisfy regulatory and accounting requirements.

A detailed summary of the valuation process and a glossary of actuarial terms are provided in the supplementary document, "State of North Carolina Retirement Systems Actuarial Valuation Report Process and Actuarial Terms Glossary" dated October 2023.

Executive Summary (continued)

Actuarial Comments and Observations

Membership

As with any estimate, the actuary collects information that we know now. Under the actuarial valuation process, current information about CJRS members is collected annually by the Retirement Systems Division staff at the direction of the actuary. Membership data will assist the actuary in estimating benefits that could be paid in the future. Information about benefit provisions and assets held in the trust as of the valuation date is also collected.

The member information the actuary collects includes data elements such as current service, salary and benefit group identifier for members that have not separated service, and actual benefit amounts and form of payment for members that have separated service. Data elements such as gender and date of birth are used to determine when a benefit might be paid and for how long.

Number as of	12/31/2022	12/31/2021
Active members	581	569
Terminated vested members and survivors of deceased members entitled to benefits but not yet receiving benefits	39	31
Terminated non-vested members and survivors of deceased members entitled to a refund of contributions	21	26
Retired members and survivors of deceased members currently receiving benefits	816	792
Total	1,457	1,418

The number of active members has increased by 2.1% from the previous valuation date. An increase in active members results in more benefits accruing but also greater contributions supporting the system. The number of retired members and survivors of deceased members currently receiving benefits increased by 3.0% from the previous valuation date. The increase in retiree population is consistent with expectations.

The number of retired members and survivors of deceased members and the benefits paid to these members have been increasing steadily, as expected based on plan assumptions.

A detailed summary of the membership data used in this valuation is provided in Section 2 and Appendix A of this report.

Assets

CJRS assets are held in trust and are invested for the exclusive benefit of plan members. The Market Value of Assets is $654 million as of December 31, 2022 and $744 million as of December 31, 2021. The investment return for the market value of assets for calendar year 2022 was (10.39)%.

Market value returns during 2022 were lower than the 6.50% assumed rate of return, resulting in higher contributions and lower funded ratio than anticipated, all else being equal.

The actuarial value of assets smooths investment gains and losses. The actuarial value of assets is $721 million as of December 31, 2022 and $703 million as of December 31, 2021. The market value of assets is lower than the actuarial value of assets, which is used to determine employer contributions. This indicates that overall, there are unrecognized asset losses to be recognized in future valuations.

Executive Summary (continued)

The lower-than-expected market return in 2022, partially offset by higher-than-expected market returns in 2019, 2020, and 2021, resulted in an actuarial value of asset return for calendar year 2022 of 4.53% and a recognized actuarial asset loss of $13.7 million during 2022. The assets at actuarial value were $153 million less than the actuarial accrued liability as of December 31, 2022.

Based on historical market returns, the current asset allocation, the current investment policy, and the expectation of future asset returns, as reviewed in the last experience study, the 6.50% discount rate used in this valuation is reasonable and appropriate.

A detailed summary of asset information is provided in Section 3 of this report.

Benefit Provisions

Benefit provisions are described in North Carolina General Statutes, Chapter 135.

This valuation reflects the provisions of S.L. 2023-134, which became law on October 3, 2023. In particular, the valuation reflects the one-time supplement for CJRS payees in pay status as of October 1, 2023 that is equal to 4% of their annual allowance and payable by November 2023. The one-time supplements do not change the ongoing monthly benefits, and absent additional action by governing authorities, the payments will not recur in future years. There have been no other significant changes in benefit provisions from the previous valuation.

Many Public Sector Retirement Systems in the United States have undergone pension reform where the benefits of members (active or future members) have been reduced. Because of the well-funded status of CJRS due to the legislature contributing the actuarially determined employer contribution on the basis of an actuarially sound funding policy, benefit cuts have not been made in North Carolina as they have been in most other states. However, if North Carolina’s investment policy shifts substantively, or incurs other unfavorable investment, economic, or demographic experience, the system should review likely impacts of the shift and consider corresponding changes to actuarial assumptions, funding policy and/or benefit levels.

A detailed summary of the benefit provisions is provided in Appendix B of this report.

Actuarial Assumptions

Actuarial assumptions bridge the gap between the information that we know with certainty as of the valuation date (age, gender, service, pay, and benefits of the members) and what may happen in the future. The actuarial assumptions of CJRS are reviewed at least every five years. Based on this review, the actuary will make recommendations on the demographic and economic assumptions.

Demographic assumptions describe future events that relate to people such as retirement rates, termination rates, disability rates, and mortality rates. Economic assumptions describe future events that relate to the assets of CJRS such as the interest rate, salary increases, the real return, and payroll growth.

The assumptions used for the December 31, 2022 actuarial valuation are based on the experience study prepared as of December 31, 2019 and adopted by the Board of Trustees on January 28, 2021. No assumption changes have been made since the prior valuation.

A detailed summary of the actuarial assumptions is provided in Appendix C of this report.

Funding Methodology

When compared to other Public Sector Retirement Systems in the United States, the funding policy for CJRS is quite aggressive in that the policy pays down unfunded actuarial accrued liability over a much shorter period of time (12 years) compared to most other Public Sector Retirement Systems. As such it is a best practice in the industry.

A detailed summary of the actuarial methods can be found in Appendix C of this report.

Executive Summary (continued)

Liabilities

The actuarial accrued liability (AAL) increased from $832 million to $877 million during 2022. CJRS is an open plan, which means that new members enter the plan each year. In an open plan, liabilities are expected to grow from one year to next as more benefits accrue and the membership approaches retirement. The AAL was $28.8 million higher than expected, resulting primarily from higher-than-expected salary increases for continuing active members as well as losses attributable to new entrants. A detailed summary of the AAL is provided in Section 4 of the report.

Funded Ratio

The funded ratio is a measure of the progress that has been made in funding the plan as of the valuation date. It is the ratio of how much money CJRS actually has in the fund to the amount CJRS should have in the fund.

The ratio of assets to liabilities shows the health of the plan on an accrued basis. The funded ratio on an actuarial basis decreased from 84.4% at December 31, 2021 to 82.3% at December 31, 2022.

Unfunded Accrued Liability

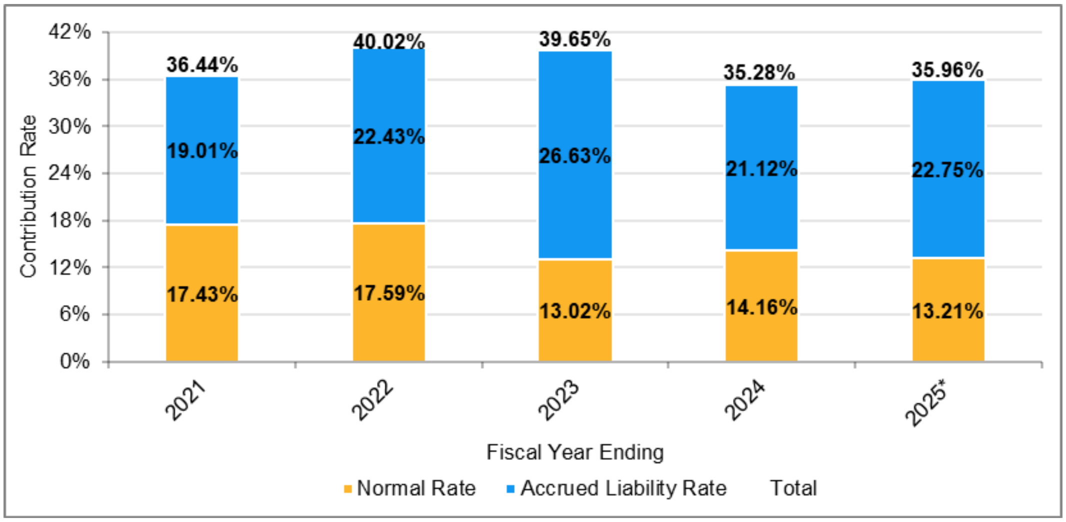
The unfunded accrued liability (UAAL) is the portion of actuarial accrued liability that is not covered by the assets of the Retirement System. The actuarial value of assets basis is used for computing contributions to alleviate contribution volatility. The difference in the actuarial accrued liability and the actuarial value of assets is the amount of unfunded actuarial accrued liability to be paid off over a 12-year period.

The UAAL increased from $129.4 million at December 31, 2021 to $155.4 million at December 31, 2022. A detailed reconciliation of the UAAL can be found in Section 4 of this report.

Executive Summary (continued)

Contributions

The graph below provides a history of actuarially determined employer contribution rates over the past five fiscal years. The rates are split into the normal rate and the accrued liability rate. The normal rate is the employer's portion of the cost of benefits accruing after reducing for the member contribution. The accrued liability rate is the payment toward the unfunded liability.



* Subject to the impact of future legislative changes effective during that fiscal year.

The actuarially determined employer required contribution rate is the amount needed to pay for the cost of the benefits accruing and to pay off the unfunded actuarial accrued liability over a 12-year period, offset for the 6% of pay contribution the members make. The 12-year period is a relatively short period for Public Sector Retirement Systems in the United States, with the funding period of most of these Systems much longer. The shorter period results in higher contributions and more benefit security.

A detailed summary of the employer required contributions rates is provided in Section 5 of this report.

Executive Summary (continued)

Risk

Measuring pension obligations and actuarially determined contributions requires the use of assumptions regarding future economic and demographic experience. Whenever assumptions are made about future events, there is risk that actual experience will differ from expected. Actuarial valuations include the risk that actual future measurements will deviate from expected future measurements due to actual experience that is different than the actuarial assumptions. The primary areas of risk in this actuarial valuation are:

- Investment Risk – the potential that investment returns will be different than expected.
- Longevity and Other Demographic Risks – the potential that mortality or other demographic experience will be different than expected.
- Interest Rate Risk – To the extent market rates of interest affect the expected return on assets, there is a risk of change to the discount rate which determines the present value of liabilities and actuarial valuation results. Table D-1 of this report demonstrates the sensitivity of valuation results to differing discount rates.
- Contribution Risk – The potential that actual contributions are different than the actuarially determined contributions.

Annual actuarial valuations are performed for RSD which re-measure the assets and liabilities and compute a new actuarially determined contribution. RSD also has experience studies performed every five years to analyze the discrepancies between actuarial assumptions and actual experience and determine if the actuarial assumptions need to be changed. Annual actuarial valuations and periodic experience studies are practical ways to monitor and reassess risk.

Executive Summary (continued)

Key Takeaways

The actuarial valuation is performed each year to replace the estimates the actuary assumed for the prior valuation with the actual events that happened. This past year, as expected, some of the assumptions used in the prior valuation were not realized. Key results of the December 31, 2022 valuation as compared to the December 31, 2021 valuation were:

- Market value returns of (10.39)% compared to 6.50% assumed at the beginning of the year
- Liabilities $28.8 million higher than anticipated as of December 31, 2022
- Continuation of direct-rate smoothing of the change in the employer contribution rate due to the changes in assumptions and methods over a 5-year period beginning with the December 31, 2020 valuation
- Recent legislation signed into law since the prior valuation
  - One-time supplement payment for CJRS payees of 4% of their annual retirement allowance, payable by November 2023

When compared to the December 31, 2021 valuation, the above resulted in:

- Lower funded ratio (82.3% in the December 31, 2022 valuation compared to 84.4% in the December 31, 2021 valuation)
- Higher actuarially determined employer contribution rate (35.96% for fiscal year ending June 30, 2025 compared to 32.84% for fiscal year ending June 30, 2024, disregarding the cost of one-time benefits for the fiscal year ending June 30, 2024)

CJRS is well funded compared to its peers. This is due to:

- Stakeholders working together to keep CJRS well-funded since inception
- A history of appropriating and contributing the recommended contribution requirements
- Assumptions that in aggregate are more conservative than peers
- A funding policy that aggressively pays down unfunded liability over a 12-year period
- An ad hoc cost-of-living adjustment that supports the health of the system
- Modest changes in benefits when compared to peers

Continued focus on these measures will be needed to maintain the solid status of CJRS well into the future.

This report, prepared as of December 31, 2022, presents the results of the annual valuation of the system. The principal results of the valuation and a comparison with the preceding year’s results are summarized in the following table.

Section 1: Principal Results

This report, prepared as of December 31, 2022, presents the results of the actuarial valuation of the system. The principal results of the valuation and a comparison with the preceding year's results are summarized below.

Table 1: Summary of Principal Results

Valuation results as of	12/31/2022	12/31/2021
Active Members		
Number	581	569
Reported Compensation	$ 81,446,656	$ 78,152,238
Valuation Compensation*	$ 88,210,873	$ 82,640,424
Retired Members and Survivors of Deceased Members Currently Receiving Benefits		
Number	816	792
Annual Allowances	$ 54,559,722	$ 52,488,539
Assets		
Actuarial Value (AVA)	$ 721,096,903	$ 702,706,558
Market Value	$ 653,867,680	$ 743,543,527
Actuarial Accrued Liability (AAL)	$ 876,518,740	$ 832,153,712
Unfunded Accrued Liability (AAL-AVA)	$ 155,421,837	$ 129,447,154
Funded Ratio (AVA/AAL)**	82.3%	84.4%
Results for Fiscal Year Ending	**6/30/2025**	**6/30/2024**
Actuarially Determined Employer Contribution (ADEC), as a percentage of payroll		
Normal Cost	13.21%	14.16%
Accrued Liability	23.97%	20.50%
Total Preliminary ADEC	37.18%	34.66%
Total ADEC Based on Direct-Rate Smoothing	35.96%	32.84%
Impact of Benefit Changes	Not Final	2.44%
Final ADEC	Not Final	35.28%
Appropriations Act for Fiscal Year Ending	**6/30/2025**	**6/30/2024**
Employer Contribution Rate as a percentage of payroll		
Normal Cost	13.21%	14.16%
Accrued Liability	N/A	21.12%
Total	N/A	35.28%

* Reported compensation annualized for new hires and projected for valuation purposes.

** The Funded Ratio on a Market Value of Assets basis is 74.6% at December 31, 2022

Section 2: Membership Data

The Retirement Systems Division provided membership data as of the valuation date for each member of CJRS. The membership data assists the actuary in estimating benefits that could be paid in the future. The tables below provide a summary of the membership data used in this valuation. Detailed tabulations of data are provided in Appendix A.

Table 2: Summary of the Membership Data

Number as of	12/31/2022	12/31/2021
Active members	581	569
Terminated vested members and survivors of deceased members entitled to benefits but not yet receiving benefits	39	31
Terminated non-vested members and survivors of deceased members entitled to a refund of contributions	21	26
Retired members and survivors of deceased members currently receiving benefits	816	792
Total	1,457	1,418

Table 3: Active Member Data

	Member Count	Average Age	Average Service	Reported Compensation
Justices of Supreme Court and Judges of Court of Appeals	22	56.90	11.79	$ 3,859,318
Judges of the Superior Court and Administrative Officers of the Court	105	57.85	13.83	17,264,823
Judges of the District Court, District Attorneys, Clerks of the Superior Court, and Public Defenders	454	53.49	10.68	60,322,516
Total	581	54.41	11.29	$ 81,446,657

The table above includes members not in receipt of benefits who were active at the end of 2022.

Section 2: Membership Data (continued)

Table 4: Terminated Vested Member Data

	Member Count	Average Age	Average Service	Annual Deferred Retirement Allowances
Justices of Supreme Court and Judges of Court of Appeals	1	65.25	24.17	$ 87,804
Judges of the Superior Court and Administrative Officers of the Court	7	57.12	9.56	215,787
Judges of the District Court, District Attorneys, Clerks of the Superior Court, and Public Defenders	31	55.02	6.15	590,255
Total	39	55.66	7.22	$ 893,846

The table above includes vested members not in receipt of benefits who were not active at the end of 2022.

Table 5: Terminated Non-Vested Member Data

	Member Count	Average Age	Average Service	Accumulated Contributions
Justices of Supreme Court and Judges of Court of Appeals	1	43.00	1.75	$ 16,290
Judges of the Superior Court and Administrative Officers of the Court	1	64.75	1.00	9,147
Judges of the District Court, District Attorneys, Clerks of the Superior Court, and Public Defenders	19	58.21	2.07	396,332
Total	21	57.80	2.00	$ 421,769

The table above includes non-vested members not in receipt of benefits who were not active at the end of 2022.

Section 2: Membership Data (continued)

Table 6: Data for Members Currently Receiving Benefits

	Member Count	Average Age	Annual Retirement Allowances
Retired Members (Healthy at Retirement)			
Male	427	74.16	$ 32,907,007
Female	200	70.42	14,074,488
Total	627	72.97	$ 46,981,495
Retired Members (Disabled at Retirement)*			
Male	1	65.75	$ 69,696
Female	1	43.67	96,027
Total	2	54.71	$ 165,723
Survivors of Deceased Members			
Male	24	73.24	$ 932,363
Female	163	77.79	6,480,141
Total	187	77.21	$ 7,412,504
Grand Total	816	73.90	$ 54,559,722

* Includes retired members reported as disabled in a prior valuation and not subsequently reported as returned to work.

Section 3: Asset Data

Assets are held in trust and are invested for the exclusive benefit of CJRS members. The tables below provide the details of the Market Value of Assets for the current and prior years' valuations.

Table 7: Market Value of Assets

Asset Data as of	12/31/2022	12/31/2021
Beginning of Year Market Value of Assets	$ 743,543,527	$ 695,354,777
Employer Contributions	36,142,442	29,344,457
Employee Contributions	6,007,299	5,210,339
Benefit Payments Other Than Refunds	(55,232,909)	(52,663,696)
Refunds	(11,874)	(31,907)
Administrative Expense	(45,234)	(34,873)
Investment Income	(76,535,571)	66,364,430
Net Increase/(Decrease)	(89,675,847)	48,188,750
End of Year Market Value of Assets	$ 653,867,680	$ 743,543,527
Estimated Net Investment Return on Market Value	-10.39%	9.67%

Table 8: Allocation of Investments by Category of the Market Value of Assets

Asset Data as of	12/31/2022	12/31/2021
Allocation by Dollar Amount		
Public Equity	$ 218,172,924	$ 266,309,997
Fixed Income (LTIF)	151,116,410	177,879,486
Cash and Receivables	107,789,380	109,334,288
Other*	176,788,966	190,019,756
Total Market Value of Assets	$ 653,867,680	$ 743,543,527
Allocation by Percentage of Asset Value		
Public Equity	33.4%	35.8%
Fixed Income (LTIF)	23.1%	23.9%
Cash and Receivables	16.5%	14.7%
Other*	27.0%	25.6%
Total Market Value of Assets	100.0%	100.0%

* Real Estate, Alternatives, Inflation and Credit

Section 3: Asset Data (continued)

In order to reduce the volatility that investment gains and losses can have on the required contributions and funded status of CJRS, the Board adopted an asset valuation method to determine the Actuarial Value of Assets used for funding purposes. The table below provides the calculation of the Actuarial Value of Assets at the valuation date.

Table 9: Actuarial Value of Assets

Asset Data as of	12/31/2022
(a) Beginning of Year Actuarial Value of Assets	$ 702,706,558
(b) Beginning of Year Market Value of Assets	743,543,527
(c) Contributions	42,149,741
(d) Benefit Payments, Refunds and Administrative Expenses	(55,290,017)
(e) Net Cash Flow	(13,140,276)
(f) Expected Investment Return	47,909,993
(g) Expected End of Year Market Value of Assets	778,313,244
(h) End of Year Market Value of Assets	653,867,680
(h) Excess of Market Value over Expected Market Value of Assets	(124,445,564)
(i) 80% of 2022 Asset Gain/(Loss)	(99,556,451)
(j) 60% of 2021 Asset Gain/(Loss)	13,048,668
(k) 40% of 2020 Asset Gain/(Loss)	10,432,640
(l) 20% of 2019 Asset Gain/(Loss)	8,845,920
(m) Total Deferred Asset Gain/(Loss)	(67,229,223)
(n) Preliminary End of Year Actuarial Value of Assets	721,096,903
(o) Final End of Year Actuarial Value of Assets (not less than 80% and not greater than 120% of Market Value)	721,096,903
(p) Estimated Net Investment Return on Actuarial Value	4.53%

Commentary: The actuarial value of assets smooths investment gains/losses, resulting in less volatility in the employer contribution. The asset valuation recognizes asset returns in excess of or less than the expected return on the market value of assets over a five-year period.

Lower-than-expected market returns in 2022 resulted in an actuarial value of asset return for calendar year 2022 of 4.53% and a recognized actuarial asset loss of $13.7 million during 2022. The assets at actuarial value were $153.3 million less than the actuarial accrued liability as of December 31, 2022.

Section 3: Asset Data (continued)

The valuation assumes that the funds will earn a 6.50% asset return. The table below provides a history of the Actuarial Value and Market Value of Asset returns.

Table 10: Historical Asset Returns

Calendar Year	Actuarial Value of Asset Return	Market Value of Asset Return
2003	8.44%	18.33%
2004	8.95%	10.73%
2005	8.56%	6.94%
2006	9.17%	11.35%
2007	9.04%	8.35%
2008	3.01%	-19.39%
2009	4.88%	14.83%
2010	6.01%	11.49%
2011	5.25%	2.18%
2012	6.42%	11.79%
2013	7.52%	12.19%
2014	7.26%	6.19%
2015	5.87%	0.35%
2016	5.33%	6.22%
2017	6.57%	13.46%
2018	5.11%	-1.41%
2019	6.20%	14.84%
2020	8.79%	11.13%
2021	9.17%	9.67%
2022	4.53%	-10.39%
20- Yr Average	6.79%	6.54%
20-Yr Range	6.16%	37.72%

Commentary: The average investment return recognized for purposes of determining the annual change in contribution each year is the actuarial value of assets return. Currently, the average actuarial return over the last 20 years of 6.79% compares with an average market return of 6.54%. The range of returns on market value of assets is markedly more volatile, 37.72% versus 6.16%. Using the actuarial value of assets instead of market value results in much lower employer contribution volatility, while ensuring that the actuarial needs of CJRS are met.

Section 4: Liability Results

Using the provided membership data, benefit provisions, and actuarial assumptions, future benefit payments of CJRS are estimated. These projected future benefit payments are discounted into today's dollars using the assumed rate of investment return assumption to determine the Present Value of Future Benefits. The Present Value of Future Benefits is allocated to past, current, and future service, respectively known as the actuarial accrued liability, normal cost and present value of future normal costs. The table below provides these liability numbers for the current and prior years' valuations.

Table 11: Liability Summary

Valuation Results as of	12/31/2022	12/31/2021
(a) Present Value of Future Benefits		
(1) Active Members	$ 444,232,873	$ 421,322,280
(2) Terminated Members	11,315,805	9,550,928
(3) Members Currently Receiving Benefits	551,459,179	532,708,904
(4) Total	$ 1,007,007,857	$ 963,582,112
(b) Present Value of Future Normal Costs	$ 130,489,117	$ 131,428,400
(c) Actuarial Accrued Liability: (a4) - (b)	$ 876,518,740	$ 832,153,712
(d) Actuarial Value of Assets	$ 721,096,903	$ 702,706,558
(e) Unfunded Accrued Liability: (c) - (d)	$ 155,421,837	$ 129,447,154

The table below provides a reconciliation of the prior year's unfunded actuarial accrued liability to the current year's unfunded actuarial accrued liability.

Table 12: Reconciliation of Unfunded Actuarial Accrued Liability (in millions)

(in millions)	
Unfunded Actuarial Accrued Liability (UAAL) as of 12/31/2021	$ 129.4
Normal Cost and Administrative Expenses during 2022	15.4
Reduction due to Actual Contributions during 2022	(42.1)
Interest on UAAL, Normal Cost, and Contributions	8.1
Asset (Gain)/Loss	13.7
Actuarial Accrued Liability (Gain)/Loss	28.8
Impact of Assumption Changes	0.0
Impact of Benefit Changes	2.1
Unfunded Actuarial Accrued Liability (UAAL) as of 12/31/2022	$ 155.4

Commentary: During 2022, the UAAL increased due to the asset loss of $13.7 million. Additionally, demographic experience increased the UAAL by $28.8 million, primarily from higher-than-expected salary increases for continuing active members as well as losses attributable to new entrants.

Section 5: Actuarially Determined Employer Contribution

The actuarially determined employer contribution consists of a normal cost rate and an accrued liability rate. The normal cost rate is the employer's portion of the cost of benefits accruing during the year after reducing for the member contribution. The accrued liability rate is the payment toward the unfunded accrued liability in order to pay off the unfunded accrued liability over 12 years. The table below provides the calculation of the actuarially determined employer contribution for the current and prior years' valuations.

Table 13: Calculation of the Actuarially Determined Contribution (ADEC)

Valuation Date ADEC for Fiscal Year Ending	12/31/2022 6/30/2025	12/31/2021 6/30/2024
Normal Cost Rate Calculation		
(a) Normal Cost Rate:	19.16%	20.11%
(b) Employee Contribution Rate	6.00%	6.00%
(c) Administrative Expenses	0.05%	0.05%
(d) Total Normal Cost Rate: (a) - (b) + (c)	13.21%	14.16%
Accrued Liability Rate Calculation		
(e) Total Annual Amortization Payments*	$ 22,032,670	$ 17,652,395
(f) Valuation Compensation**	91,912,600	86,121,339
(g) Accrued Liability Rate: (e) / (f)	23.97%	20.50%
Preliminary ADEC (d) + (g)	37.18%	34.66%
ADEC With Direct-Rate Smoothing	35.96%	32.84%
Impact of Benefit Changes	Not Final	2.44%
Final ADEC	Not Final	35.28%

* See Table 16 for more detail
** Beginning with the December 31, 2017 valuation, compensation is projected to the fiscal year over which contributions will occur.

Section 5: Actuarially Determined Employer Contribution (continued)

The table below provides a reconciliation of the actuarially determined employer contribution.

Table 14: Reconciliation of the Change in the ADEC

Fiscal year ending June 30, 2023 Preliminary ADEC (based on December 31, 2021 valuation)	32.84%
Impact of Legislative Changes*	2.44%
Fiscal year ending June 30, 2023 Final ADEC	35.28%
Change Due to Anticipated Reduction in UAAL**	(1.19%)
Change Due to Demographic (Gain)/Loss	2.50%
Change Due to Investment (Gain)/Loss	2.02%
Change Due to Contributions Less (Greater) than ADEC	(1.11%)
Impact of Assumption Changes	0.00%
Impact of Benefit Changes	0.30%
Impact of Direct Rate Smoothing	0.60%
Reversal of one-time Legislative Costs	(2.44%)
Fiscal year ending June 30, 2025 Preliminary ADEC (based on December 31, 2022 valuation)	35.96%

* Due to the one-time pension supplement to be paid by November 2023.

** Amortization of the UAAL included a fresh-start 9-year amortization for the December 31, 2009, valuation with the first payment effective July 1, 2011. However, the Appropriations Act of 2011 changed the period over which the UAAL is amortized from nine years to 12 years, retroactive to July 1, 2011, as implemented in the December 31, 2010, valuation.

Section 5: Actuarially Determined Employer Contribution (continued)

Amortization methods determine the payment schedule for the unfunded actuarial accrued liability. CJRS adopted a 12-year closed amortization period for fiscal year ending 2012. A new amortization base is created each year based on the prior years' experience. The tables below provide the calculation of the new amortization base and the amortization schedule for the current year's valuation.

Table 15: Calculation of the New Amortization Base

Calculation as of	12/31/2022	12/31/2021
(a) Unfunded Actuarial Accrued Liability	$ 155,421,837	$ 129,447,154
(b) Prior Years' Outstanding Balances	117,824,221	126,566,945
(c) New Amortization Base: (a) - (b)	37,597,616	2,880,209
(d) New Amortization Payment	4,907,756	375,964

Table 16: Amortization Schedule for Unfunded Accrued Liability

Date Established	Original Balance	12/31/2022 Outstanding Balance	Annual Payment Effective 7/1/2024
December 31, 2009	$ 34,962,037	$ 2,326,654	$ -
December 31, 2010	3,913,729	754,906	-
December 31, 2011	10,017,079	3,112,749	1,345,874
December 31, 2012	(4,239,030)	(1,783,325)	(567,820)
December 31, 2013	(892,665)	(467,096)	(119,219)
December 31, 2014	(6,478,378)	(4,009,801)	(862,722)
December 31, 2015	36,271,204	25,684,292	4,815,940
December 31, 2016	13,868,882	10,965,886	1,834,777
December 31, 2017	19,189,149	16,644,626	2,529,226
December 31, 2018	10,337,549	9,722,382	1,360,103
December 31, 2019	10,042,676	10,116,342	1,317,062
December 31, 2020	39,037,649	41,689,183	5,095,729
December 31, 2021	2,880,209	3,067,423	375,964
December 31, 2022	37,597,616	37,597,616	4,907,756
Total		$ 155,421,837	$ 22,032,670

Commentary: This is the payment schedule for the unfunded actuarial accrued liability of CJRS.

Section 5: Actuarially Determined Employer Contribution (continued)

The table below provides a history of the actuarially determined employer contribution and the corresponding appropriated rate.

Table 17: History of Actuarially Determined Employer Contributions and Appropriated Rates

Valuation Date	Fiscal Year Ending	Normal Rate*	Accrued Liability Rate	Change due to Legislation**	Final ADEC	Appropriated Rate
12/31/2022	6/30/2025	13.21%	22.75%	N/A	N/A	N/A
12/31/2021	6/30/2024	14.16%	18.68%	2.44%	35.28%	35.28%
12/31/2020	6/30/2023	13.02%	23.99%	2.64%	39.65%	39.65%
12/31/2019	6/30/2022	17.59%	21.11%	1.32%	40.02%	40.02%
12/31/2018	6/30/2021	17.43%	19.01%	0.00%	36.44%	36.44%

* Includes Death Benefit rate

** The change due to legislation for the contribution for fiscal year ending June 30, 2024 provided for a one-time supplement equal to 4% of the annual retirement allowance payable by November 2023. The change due to legislation for the contribution for fiscal year ending June 30, 2023 provided for a one-time supplement equal to 4% of the annual retirement allowance payable in October 2022. The change due to legislation for the contribution for fiscal year ending June 30, 2022 provided for a 2% one-time supplement payable in December 2021.

The following table shows estimates of the potential cost of two types of benefit improvements if they were enacted based on the results of the December 31, 2022 or December 31, 2021 valuations. The first benefit improvement is a permanent one-time cost-of-living increase and the second benefit improvement is a one-time supplement payment for retirees during the upcoming year ending December 31, 2023.

Table 18: Cost of Benefit Enhancements

Calculation as of	12/31/2022	12/31/2021
Increase in UAAL for a 1% COLA	$ 5,884,000	$ 5,858,000
Increase in ADEC for a 1% COLA	0.84%	0.89%
Increase in UAAL for a 1% Supplement	$ 587,000	$ 520,000
Increase in ADEC for a 1% Supplement	0.64%	0.61%

The 1% COLA in the December 31, 2022 column would be effective July 1, 2024 and includes expected costs of COLAs paid for retirements after December 31, 2022 and before June 30, 2024. The COLA would be paid in full to retired members and survivors of deceased members on the retirement roll on July 1, 2023 and would be prorated for retired members and survivors of deceased members who commence benefits after July 1, 2023 but before June 30, 2024. We are assuming that the cost of the COLA is amortized over a 12-year period.

The 1% Supplement in the December 31, 2022 column includes expected costs of supplements paid for retirement after December 31, 2022 and before June 30, 2024. The supplement would equal to 1.0% of the annual allowances of retirees and other beneficiaries who commence retirement on or before July 1, 2024. We are assuming that the cost of the supplement is amortized over a one-year period.

Appendix A: Detailed Tabulations of Member Data

Table A-1: The Number and Average Reported Compensation of Active Members Distributed by Age and Service as of December 31, 2022

	Years of Service										
Age	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & Up	Total
Under 25	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
25 to 29	1 7,902	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	1 7,902
30 to 34	0 0	5 125,296	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	5 125,296
35 to 39	4 25,464	14 133,660	12 136,813	0 0	0 0	0 0	0 0	0 0	0 0	0 0	30 120,495
40 to 44	3 19,676	30 130,855	14 145,256	4 153,035	2 142,201	0 0	0 0	0 0	0 0	0 0	53 130,468
45 to 49	6 20,804	35 126,173	20 140,665	10 152,264	3 152,260	1 182,835	0 0	0 0	0 0	0 0	75 126,886
50 to 54	7 18,119	32 139,666	24 147,756	29 149,411	15 158,868	12 156,874	5 148,200	3 117,336	0 0	0 0	127 140,423
55 to 59	4 9,671	25 137,586	11 136,922	21 148,585	10 152,203	19 166,429	11 152,512	5 164,344	0 0	0 0	106 144,229
60 to 64	4 10,110	21 138,714	21 151,837	12 147,488	15 154,886	7 153,439	7 157,252	11 155,916	0 0	2 127,038	100 143,791
65 to 69	0 0	7 138,348	10 147,627	7 155,781	8 158,170	6 165,717	6 170,319	7 178,302	4 151,157	1 206,035	56 158,492
70 & Up	0 0	4 142,502	4 155,266	2 136,718	3 143,157	7 165,941	3 177,242	1 192,181	0 0	4 152,510	28 156,768
Total	29 17,226	173 134,103	116 145,059	85 149,668	56 154,721	52 162,643	32 158,532	27 160,337	4 151,157	7 152,879	581 140,184

Appendix A: Detailed Tabulations of Member Data (continued)

Table A-2: The Number and Reported Compensation of Active Members Distributed by Age as of December 31, 2022

	Men		Women	
Age	Number	Compensation	Number	Compensation
27	1	$ 7,902		
33			2	282,530
34	2	271,627	1	72,325
35	1	132,646	3	398,725
36	4	511,428	4	318,528
37	2	287,517	2	247,162
38	5	700,011	3	324,181
39	5	558,421	1	136,238
40	2	263,537	6	752,673
41	2	291,100	3	59,029
42	12	1,706,561	2	267,418
43	6	838,240	3	410,489
44	11	1,520,311	6	805,451
45	7	991,034	8	979,818
46	10	1,454,089	5	674,955
47	10	1,346,455	8	1,088,536
48	10	1,293,065	8	829,013
49	3	208,849	6	650,622
50	9	1,299,541	10	1,094,453
51	20	2,882,580	7	1,062,609
52	16	2,373,559	14	1,946,010
53	12	1,697,237	10	1,355,575
54	14	1,939,151	15	2,183,006
55	14	2,127,664	8	1,072,526
56	15	2,184,097	9	1,325,031
57	15	2,197,282	11	1,469,088
58	9	1,359,106	8	956,485
59	8	1,198,439	9	1,398,582
60	12	1,789,366	10	1,420,210
61	10	1,490,386	8	963,506
62	14	2,147,562	9	1,210,305
63	14	2,207,839	6	736,240
64	7	999,174	10	1,414,532
65	10	1,596,259	5	701,302
66	10	1,702,045	4	508,604
67	9	1,460,147	1	150,088
68	12	2,033,882	1	132,646
69	3	462,496	1	128,052
70	10	1,609,349	2	297,785
71	10	1,573,275	1	198,049
73	2	262,006		
74	1	131,024	1	149,519
78	1	168,501		
Total	350	$ 51,274,760	231	$ 30,171,896

Appendix A: Detailed Tabulations of Member Data (continued)

Table A-3: The Number and Reported Compensation of Active Members Distributed by Service as of December 31, 2022

	Men		Women	
Service	Number	Compensation	Number	Compensation
0	10	$ 118,914	19	$ 380,654
1	10	1,075,918	13	$ 1,252,637
2	47	6,566,113	29	4,001,116
3	8	1,064,590	6	885,102
4	35	4,936,079	25	3,418,264
5	10	1,398,773	7	920,992
6	15	2,214,783	18	2,531,134
7	10	1,567,278	1	139,018
8	30	4,441,404	13	1,873,265
9	9	1,339,505	3	400,676
10	12	1,753,475	9	1,229,465
11	2	324,739	2	290,721
12	16	2,456,084	13	1,858,831
13	7	1,114,641	4	629,599
14	9	1,428,290	11	1,635,894
15	6	906,386	6	915,925
16	14	2,146,405	5	786,647
17	6	984,037	1	151,744
18	9	1,435,032	5	794,210
19	2	274,071	2	269,890
20	8	1,272,576	5	774,695
21	1	181,106	3	465,955
22	10	1,709,547	5	816,527
23	8	1,301,838		
24	9	1,461,775	3	473,415
25	5	828,119	2	285,457
26	5	822,214	3	433,213
27	2	266,332		
28	8	1,328,916	1	123,102
29	3	518,661	3	467,021
30	1	158,110	5	821,048
31	1	169,810	2	226,355
32	6	1,108,561	3	413,889
33	4	599,010		
34	3	571,218	2	261,104
35	1	179,619		
36	1	128,052		
38			1	116,279
39	1	180,680		
41	1	126,024	1	128,052
43	2	398,216		
46	1	118,334		
50	2	299,525		
Total	350	$ 51,274,760	231	$ 30,171,896

Appendix A: Detailed Tabulations of Member Data (continued)

Table A-4: The Number and Accumulated Contributions of Terminated Members Distributed by Age as of December 31, 2022

	Men		Women	
Age	Number	Contributions	Number	Contributions
35	1	$ 33,985		
40	1	4,017		
41	1	24,719		
42			1	$ 13,271
43	1	16,290		
46	1	70,188	1	13,432
47			1	13,358
48			1	5,523
49			1	145,821
50	1	46,795		
51	2	120,843	1	280,074
52	3	32,483	1	105,924
53	1	56,155	2	73,387
54			1	68,465
55	3	102,480	1	97,046
56	3	234,286	1	5,361
57	5	163,131	1	5,946
58	2	58,836	1	58,370
59	1	17,758	1	6,371
60	2	108,692	1	4,377
61			1	111,278
62	1	50,208		
63	1	7,899	1	49,614
64	1	24,036	1	12,096
65	3	369,304	1	238,818
69	1	38,457		
70	1	58,460		
72	2	29,046	1	53,241
74			1	343,587
Total	38	$ 1,668,068	22	$ 1,705,360

Appendix A: Detailed Tabulations of Member Data (continued)

Table A-5: The Number and Annual Retirement Allowances of Retired Members (Healthy at Retirement) and Survivors of Deceased Members Distributed by Age as of December 31, 2022

	Men		Women	
Age	Number	Allowances	Number	Allowances
44			1	$ 18,531
52	1	$ 72,906	2	107,628
53			2	131,791
54	2	133,338	1	129,197
55	3	131,946	2	53,973
56	1	117,348	5	273,015
57	2	239,194	2	249,660
58	3	210,176	9	623,521
59	4	335,713	3	266,298
60	4	362,232	6	299,184
61	4	262,979	15	1,073,266
62	4	192,885	4	248,306
63	7	566,568	6	431,490
64	4	434,528	6	429,223
65	4	372,732	8	480,430
66	13	1,050,271	21	1,210,651
67	7	654,053	14	1,093,728
68	20	1,425,135	18	1,047,300
69	19	1,523,709	15	827,885
70	19	1,356,803	11	575,436
71	24	1,785,539	14	784,320
72	21	1,662,047	14	888,742
73	36	2,603,768	16	1,089,676
74	32	2,399,347	11	807,776
75	27	1,905,735	7	522,946
76	37	2,842,851	11	519,887
77	29	2,067,669	17	901,951
78	17	1,168,317	9	417,794
79	17	1,172,903	6	260,210
80	19	1,321,755	10	695,668
81	10	813,330	14	508,240
82	9	772,334	2	15,034
83	10	943,855	7	420,872
84	6	522,040	10	381,736
85	8	569,635	10	411,046

Appendix A: Detailed Tabulations of Member Data (continued)

Table A-5: The Number and Annual Retirement Allowances of Retired Members (Healthy at Retirement) and Survivors of Deceased Members Distributed by Age as of December 31, 2022 (continued)

	Men		Women	
Age	Number	Allowances	Number	Allowances
86	6	$ 499,764	9	$ 458,868
87	6	312,755	3	92,572
88	3	140,188	8	503,628
89	4	217,405	4	118,104
90	1	116,380	9	336,031
91	2	185,402	2	158,340
92	1	104,058	3	210,127
93	3	221,633	3	193,470
94	2	48,144	4	73,862
95			2	38,059
96			2	47,506
97			1	36,536
98			1	9,773
100			1	11,326
102			1	20,263
105			1	49,753
Total	451	$ 33,839,370	363	$ 20,554,629

Table A-6: The Number and Annual Retirement Allowances of Retired Members (Healthy at Retirement) and Survivors of Deceased Members Distributed by Annuity Type as of December 31, 2022

	Men		Women	
Annuity Type	Number	Allowances	Number	Allowances
Maximum	228	$ 17,746,318	156	$ 10,785,056
Option 1	2	166,113		
Option 2	53	3,304,559	9	685,861
Option 3	52	4,522,884	7	530,436
Option 4	3	265,109	6	241,509
Option 5-2				
Option 5-3				
Option 6-2	31	1,990,076	4	428,448
Option 6-3	57	4,897,338	18	1,403,178
Other	1	14,610		
Survivors of Deceased Members	24	932,363	163	6,480,141
Total	451	$ 33,839,370	363	$ 20,554,629

Appendix A: Detailed Tabulations of Member Data (continued)

Table A-7: The Number and Annual Retirement Allowances of Retired Members (Disabled at Retirement) Distributed by Age as of December 31, 2022

	Men		Women	
Age	Number	Allowances	Number	Allowances
44			1	$ 96,027
66	1	$ 69,696		
Total	1	$ 69,696	1	$ 96,027

Table A-8: The Number and Annual Retirement Allowances of Retired Members (Disabled at Retirement) Distributed by Annuity Type as of December 31, 2022

	Men		Women	
Annuity Type	Number	Allowances	Number	Allowances
Maximum	1	$ 69,696	1	$ 96,027
Option 1				
Option 2				
Option 3				
Option 4				
Option 5-2				
Option 5-3				
Option 6-2				
Option 6-3				
Other				
Total	1	$ 69,696	1	$ 96,027

Appendix B: Summary of Main Benefits & Contribution Provisions

All justices, judges, district attorneys, and public defenders of the General Court of Justice, and clerks of the Superior Court are eligible for membership.

Final Compensation

The annual rate of compensation of the member at his date of termination or death.

Average Final Compensation

Average annual compensation during the 48 consecutive calendar months of membership producing the highest average.

Creditable Service

Creditable service includes all service rendered as a justice of the Supreme Court, judge of the Court of Appeals, judge of the Superior Court, judge of the District Court Division of the General Court of Justice, Administrative Officer of the Courts, District Attorney, Public Defender or as a Clerk of the Superior Court.

Service Retirement Allowance

Conditions for Allowance

A service retirement allowance is payable to any member who retires from service and

(a) had attained age 50 and was in service on October 8, 1981; or

(b) has attained age 50 and completed five or more years of creditable service; or

Retirement is compulsory at age 76 for Supreme Court Justices and Appellate judges, and 72 if the member is a justice or judge of the Superior or District Divisions of the General Court of Justice.

Unreduced Allowance

An unreduced annual service retirement allowance is payable to a member who:

(a) has attained age 65 and completed five years of creditable service; or

(b) has attained age 50 and completed 24 years of creditable service.

The Service Retirement Allowance is equal to:

(i) 4.02% of final compensation multiplied by the number of years of creditable service rendered as a justice of the Supreme Court or judge of the Court of Appeals, plus

(ii) 3.52% of final compensation multiplied by the number of years of creditable service rendered as a judge of the Superior Court or as Administrative Officer of the Courts, plus

(iii) 3.02% of final compensation multiplied by the number of years of creditable service rendered as a judge of the District Court, District Attorney, Public Defender, or Clerk of the Superior Court, plus

(iv) A service retirement allowance computed on average final compensation, service transferred from the Teachers' and State Employees' Retirement System or the Local Governmental Employees' Retirement System and the applicable formula accrual rate from the previous system.

Reduced Allowance

A reduced annual service retirement allowance is payable to a member who retires:

(a) prior to the earlier of attainment of age 65 and completion of five years of creditable service

(b) prior to attainment of age 50 or the completion of 24 years of creditable service.

The reduced amount is an allowance as computed above reduced by 3% for each year that the member's retirement date precedes the date upon which the member would have attained age 65 or completed 24 years of service had he or she remained in service, whichever is earlier.

Appendix B: Summary of Main Benefits & Contribution (continued)

Maximum Amount

The maximum annual service retirement allowance (on an unreduced basis) is the amount which, when added to the member's benefit payable from the Teachers' and State Employees' Retirement System, Local Governmental Employees' Retirement System, or Legislative Retirement System (all on an unreduced basis) would total 75% of the member's final compensation.

Minimum Amount

In no event will a member whose creditable service commenced prior to January 1, 1974 as a justice of the Supreme Court, as a judge of the Court of Appeals, as an Administrative Officer of the courts, or as a judge of the Superior Court, receive a smaller retirement allowance than he or she would have received under Chapter 7A of the General Statutes.

Disability Retirement Allowance

Condition for Allowance

Any member who becomes permanently and totally disabled prior to the attainment of age 65 and who has completed at least five years of creditable service may be retired by the Board of Trustees on a disability retirement allowance. Any retired member may also apply for a disability retirement allowance within the first three years of retirement.

Amount of Allowance

The disability retirement allowance is computed as a Service Retirement Allowance based on the number of years of creditable service the member would have had had he or she remained in service to the earliest date he or she could have retired on an unreduced service retirement allowance.

Deferred Allowance

Any member who separates from service prior to age 50 and completion of five years of creditable service and who leaves his total accumulated contributions in the system may receive a deferred allowance, beginning at age 50, computed in the same way as a service retirement allowance on the basis of creditable service and compensation to the date of separation.

Spouse Benefit

Conditions for Benefit

Upon the death of a member in active service after attainment of age 50 and completion of five years of creditable service a death benefit is payable to his or her surviving spouse.

Amount of Benefit

The surviving spouse receives a lump sum payment equal to the member's final compensation. In addition, the surviving spouse receives an annual retirement allowance, until death or remarriage, equal to 50% of the service retirement allowance to which the member would have been entitled had retirement occurred on the first day of the calendar month coincident with or next following his or her date of death reduced by 2% for each year that the member's age exceeds that of the spouse.

Lump Sum Death Benefit

Upon the death of a member in active service prior to attainment of age 50 a lump sum payment equal to the member's accumulated contributions plus his or her final compensation is made to the designated beneficiary or estate.

Appendix B: Summary of Main Benefits & Contribution (continued)

Death after Retirement

Upon the death of a retired member while in receipt of a service retirement allowance or after age 65 if in receipt of a disability retirement allowance an allowance is paid to his or her spouse, until death or remarriage, equal to one-half the allowance which was payable to the member prior to death reduced by 2% for each year that the member's age exceeds that of the spouse.

Upon the death of a member in receipt of a disability retirement allowance prior to age 65, an allowance is paid to his or her spouse, until death or remarriage, equal to one-half the service retirement allowance the member would have received had he or she remained in service up to the date of death reduced by 2% for each year that the member's age exceeds that of the spouse.

Upon the death of a beneficiary who did not retire under an effective election of Option 2, 3, 5 or 6, an amount equal to the excess if any, of the member’s accumulated contributions at retirement over the retirement allowance payments received is paid to a designated person or to the beneficiary's estate.

Upon the death of the survivor of a beneficiary who retired under an effective election of Option 2, 3, 5 or 6, an amount equal to the excess, if any, of the beneficiary's accumulated contributions at retirement over the total retirement allowance payments received is paid to such other person designated by the beneficiary or to the beneficiary's estate.

Other Death Benefits

Upon the death of a member in service, other benefits may be provided by the Death Benefit Plan.

Return of Contributions

Any member who terminates service other than by retirement or death is entitled to the return of accumulated contributions.

If the total retirement allowance payments to a retired member, spouse and/or beneficiary under option are less than the member's accumulated contributions at retirement, the excess is paid to the designated beneficiary or legal representatives.

The current interest rate on member contributions is 4%.

Optional Allowances

In lieu of the full retirement allowance, any member may elect to receive a reduced retirement allowance equal in value to the full allowance, with the provision that:

Option 1

> A member retiring prior to July 1, 1993 may elect that at his or her death within 10 years from retirement date, an amount equal to his or her accumulated contributions at retirement, less 1/120 for each month he or she has received a retirement allowance payment, is paid to the estate, or to a person designated by the member, or

Option 2

> At the death of the member his or her allowance shall be continued throughout the life of such other person as the member shall have designated at the time of retirement, or

Option 3

> At the death of the member one-half of his or her allowance shall be continued throughout the life of such other person as the member shall have designated at the time of retirement, or

Appendix B: Summary of Main Benefits & Contribution (continued)

Option 4

At retirement, any member may elect to receive a retirement allowance in such amount that, together with his or her Social Security benefit, the member will receive approximately the same income per annum before and after the earliest age at which he or she becomes eligible to receive the Social Security benefit. A member who elects to receive his or her allowance under this option is deemed to have elected Option 1 also, or

Option 5

A member retiring prior to July 1, 1993 may elect to receive a reduced retirement allowance during his or her life with some other benefit approved by the Board of Trustees payable after death, or the member may elect to receive a reduced retirement allowance under the provisions of Option 2 or Option 3 in conjunction with the provisions of Option 1, or

Option 6

A member may elect either Option 2 or Option 3 with the added provision that in the event the designated beneficiary predeceases the member, the retirement allowance payable to the member after the designated beneficiary's death shall be equal to the retirement allowance which would have been payable had the member not elected the Option.

Unused Sick Leave

Unused sick leave counts as creditable service at retirement. Sick leave which was converted from unused vacation leave is also creditable. One month of credit is allowed for each 20 days of unused sick leave, plus an additional month for any part of 20 days left over.

Post-Retirement Increases in Allowance

Future increases in allowances may be granted at the discretion of the State.

Contributions

Member Contributions

Each member contributes 6% of annual compensation.

Employer Contributions

The State makes annual contributions consisting of a normal contribution and an accrued liability contribution. The normal contribution covers the liability on account of current service and is determined by the actuary after each valuation.

The accrued liability contribution covers the past service liability that exceeds the actuarial value of assets.

Changes Since Prior Valuation

The December 31, 2022 valuation reflects the one-time supplement for CJRS payees in pay status as of October 1, 2023 that is equal to 4% of their annual allowance and payable by November 2023.

The required retirement age increased from 72 to 76 for Supreme Court Justices and appellate judges. This change in provision did not have an impact on the valuation.

Appendix C: Actuarial Assumptions and Methods

Assumptions are based on the experience investigation prepared as of December 31, 2019 and adopted by the Board of Trustees on January 28, 2021 for use beginning with the December 31, 2020 annual actuarial valuation.

Interest Rate

6.50% per annum, compounded annually.

Price Inflation

2.50% per annum, compounded annually.

Real Wage Growth

0.75% per annum.

Payroll Growth

3.25% per annum.

Withdrawal

2.00% termination rate assumed for all years.

Separations Before Retirement

Representative values of the assumed annual rates of separation are as follows:

	Annual Rates of		
	Disability	Base Mortality*	
Age	Male & Female	Male	Female
25	.00002	.00024	.00008
30	.00003	.00031	.00013
35	.00008	.00041	.00021
40	.00017	.00057	.00033
45	.00035	.00085	.00051
50	.00059	.00129	.00076
55	.00119	.00190	.00112
60	.00192	.00276	.00169
64	.00246	.00375	.00245

* Base mortality rates as of 2010.

Appendix C: Actuarial Assumptions and Methods (continued)

Service Retirement

Representative values of the assumed annual rates of service retirement are as follows:

Annual Rates of Retirement						
	Service					
Age	5	10	15	20	24	25 +
50	.020	.020	.020	.020	.150	.090
55	.020	.020	.020	.020	.050	.090
60	.040	.040	.040	.040	.200	.170
65	.120	.120	.120	.120	.120	.120
70	.250	.250	.250	.250	.250	.250

All members are assumed to retire no later than age 72. S.L. 2023-134, which became law on October 3, 2023, increases the required retirement age from 72 to 76 for Supreme Court Justices and appellate judges. We do not expect this change to have a material impact on active member retirement patterns for the current population, and accordingly did not change the service retirement assumption. We will continue to monitor retirement experience.

Salary Increases (Merit Only)

Representative values of the assumed annual rates of salary merit increases are as follows:

Annual Rate of Salary Increase	
Service	Rate
0	.0150
5	.0100
10	.0050
>=15	.0000

Deaths After Retirement

Representative values of the assumed post-retirement mortality rates in 2010 prior to any mortality improvements are as follows:

Annual Rate of Death after Retirement (Retired Members and Survivors of Deceased Members)						
	Retirement (Healthy at Retirement)		Survivors of Deceased Members		Retirees (Disabled at Retirement)	
Age	Male	Female	Male	Female	Male	Female
55	.00387	.00275	.01147	.00742	.02114	.01742
60	.00552	.00371	.01450	.00975	.02503	.01956
65	.00820	.00595	.02086	.01332	.03044	.02256
70	.01381	.01032	.03221	.01931	.03901	.02862
75	.02437	.01827	.04971	.02946	.05192	.04003.
80	.04391	.03260	.07802	.04698	.07348	.06007

Deaths After Retirement (Healthy Members at Retirement)

Mortality rates are based on the Pub-2010 General Retirees Above-Median Amount-Weighted Mortality.

Appendix C: Actuarial Assumptions and Methods (continued)

Deaths After Retirement (Disabled Members at Retirement)

Mortality rates are based on the Pub-2010 General Disabled Retirees Amount-Weighted Mortality.

Deaths After Retirement (Survivors of Deceased Members)

Mortality rates are based on the Pub-2010 Below-median Teachers Mortality Table for Contingent Survivors. Rates for male members are Set Forward 3 years. Rate for female members are Set Forward 1 year. Because the contingent survivor tables have no rates prior to age 45, the Below-median Teachers Mortality Table for Employees is used for ages less than 45Teachers Contingent Survivors Below Median Amount-Weighted Mortality.

Deaths Prior to Retirement

Mortality rates are based on the Pub-2010 General Employees Amount- Weighted Mortality.

Mortality Projection

All mortality rates are projected from 2010 using generational improvement with Scale MP-2019.

Timing of Assumptions

All withdrawals, deaths, disabilities, retirements, and salary increases are assumed to occur July 1 of each year. The timing of retirement changes from mid-year to beginning of year at and after the 100% retirement age.

Liability for Inactive Members

The liability for members who terminated prior to five years of creditable service is estimated to be 100% of the member's accumulated contributions. The liability for members who terminated after completing five years of creditable service is estimated based on the member's current age and the service and reported compensation at termination of employment.

Administrative Expenses

0.05% of payroll added to the normal cost rate.

Marriage Assumption

90% of male members married and 50% of female members married with the male spouses three years older than female spouses.

Missing Gender Code

For members reported on the data without a gender code, we use the prior year's code where available or assign a code based on first name.

Reported Compensation

Calendar year compensation as furnished by the system's office.

Valuation Compensation

Reported compensation adjusted to reflect the assumed rate of pay as of the valuation date and the probability of decrement during the year.

Appendix C: Actuarial Assumptions and Methods (continued)

Compensation Limits

No compensation limits are applied.

Actuarial Cost Method

Entry age normal cost method. Entry age is established on an individual basis.

Normal Cost

Normal cost rate reflects the impact of new entrants during the year.

Amortization Period

12-year closed, level-dollar amount. The first amortization base was created for the contribution payable for fiscal year ending 2012.

Asset Valuation Method

Actuarial value, as developed in Table 9. 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 return on market value of assets will be reflected in the actuarial value of assets over a five- year period. The calculation of the Actuarial Value of Assets is based on the following formula:

$MV - 80\% \times G/(L)_1 - 60\% \times G/(L)_2 - 40\% \times G/(L)_3 - 20\% \times G/(L)_4$

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 Assumptions and Methods Since Prior Valuation

The assumptions and methods used for the December 31, 2022 actuarial valuation are based on the experience study prepared as of December 31, 2019 and adopted by the Board of Trustees on January 28, 2021.

Appendix D: Additional Disclosures

Table D-1 illustrates the sensitivity of certain valuation results to changes in the discount rate on a market value of assets basis. Table D-2 provides an estimate of future market value of asset returns based on the current portfolio structure and summarized in the "NCRS Investment Policy Statement Review" presentation prepared by the DST Investment Management Division and dated May 25, 2022.

Section 6(c) of Session Law 2016-108 requires that the actuarial valuation report provide the valuation results using a 30-year treasury rate as of December 31 of the year of the valuation as the discount rate. This is 3.97% at December 31, 2022 and has been used as the lower bound of the sensitivity analysis presented. The range between the current discount rate (6.50%) and the 30-year treasury rate (3.97%) was used to establish an upper bound for sensitivity analysis (9.03%). Based on the analysis performed by Callan for DST's Investment Management Division in 2022, the lower bound of 3.97% returns is between 75% to 95% likely to be achieved on average over the next 30 years, while the upper bound of 9.03% is more than 5% likely to be achieved on average over the next 30 years.

Table D-1: Sensitivity of Valuation Results as of December 31, 2022

Discount Rate	3.97%	5.24%	6.50%	7.77%	9.03%
Market Value of Assets	$ 653,867,680	$ 653,867,680	$ 653,867,680	$ 653,867,680	$ 653,867,680
Actuarial Accrued Liability	$ 1,147,757,409	$ 997,016,196	$ 876,518,740	$ 777,498,914	$ 696,529,146
Unfunded Accrued Liability (UAL)	$ 493,889,729	$ 343,148,516	$ 222,651,060	$ 123,631,234	$ 42,661,466
Funded Ratio	57.0%	65.6%	74.6%	84.1%	93.9%
20-Year Amortization of UAL	$ 37,683,622	$ 29,570,440	$ 21,520,314	N/A	N/A
(as % of general state revenue)	0.09%	0.07%	0.05%	N/A	N/A

Other than the discount rate, these results are based on the other economic and demographic assumptions presented in the report. For purposes of simplicity in this disclosure, no adjustments to the valuation assumption for inflation were reflected in the sensitivities above. The statute also requires that the actuarial valuation report show the results using a market value of assets basis. The "funded ratio" and "unfunded accrued liability" in Table D-1 are based upon the market value of assets. In order to alleviate volatility, future employer contributions are determined based on the actuarial value of assets, which smooths market value returns.

None of the liability amounts shown are intended to imply the amount that might represent the cost of any settlement of the plan's obligations. The various caveats, constraints, and discussions presented earlier in the report apply to these results as well.

Table D-2: Estimate of Future Asset Returns

Horizon	95% Chance (19 out of every 20 scenarios)	75% Chance (3 out of every 4 scenarios)	50% Chance (1 out of every 2 scenarios)	25% Chance (1 out of every 4 scenarios)	5% Chance (1 out of every 20 scenarios)
10 Years (2032)	0.4%	3.6%	5.7%	7.8%	11.1%
30 Years (2052)	3.3%	5.1%	6.3%	7.6%	9.3%

This analysis was commissioned by the Investment Management Division and presented by Callan to the Investment Advisory Committee on February 23, 2022.