BUCK
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Teachers' and State Employees' Retirement System of North Carolina

Principal Results of Actuarial Valuation as of December 31, 2022

October 26, 2023, Board of Trustees Meeting

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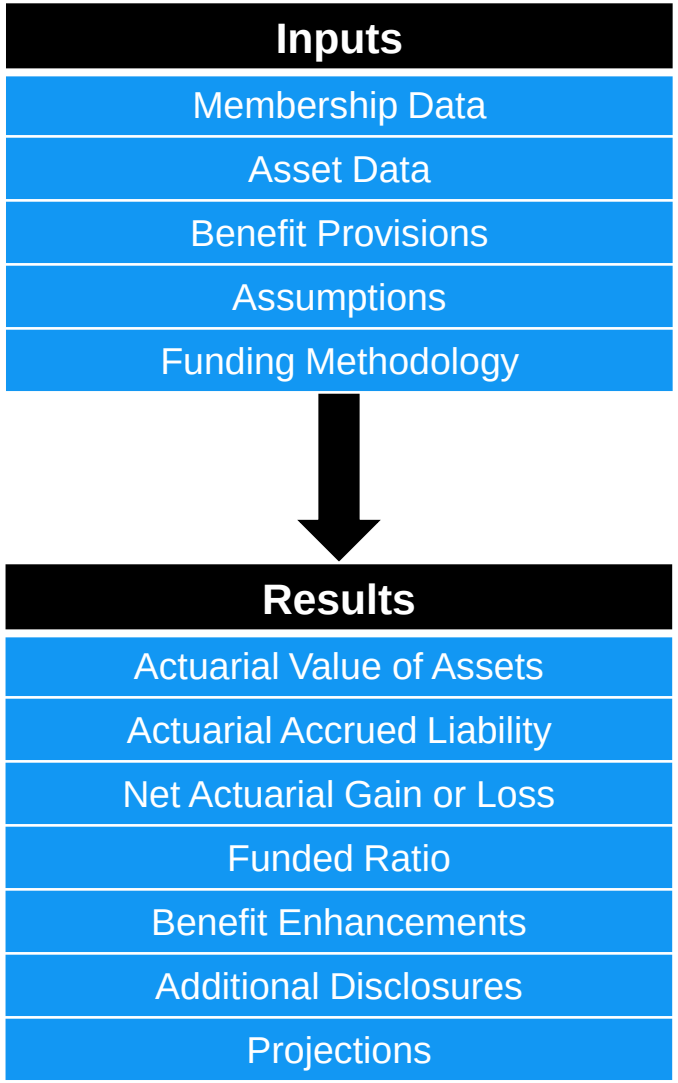
Purpose of the annual actuarial valuation

- As of the end of each calendar year:
  - An annual actuarial valuation is performed on TSERS
  - The actuary determines the amount of employer contributions to be made to TSERS during each member's career that, when combined with investment return and member contributions, are expected to be sufficient to pay for retirement benefits
- The annual actuarial valuation is performed to:
  - Determine the progress on funding TSERS
  - Explore why the results of the current valuation differ from the results of the valuation of the previous year
  - Satisfy regulatory and accounting requirements

The valuation process

- The diagram to the right summarizes the inputs and results of the actuarial valuation process.
- 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.
- Bars at the top of the page, consistent with the diagram to the right, will appear throughout the presentation to designate where we are in the valuation process. Some of the items on the bars at the top of the page are covered in the appendix to the presentation.



Valuation input

Membership data

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	297,802	300,310
Members currently receiving Disability Income Plan benefits	4,491	4,961
Terminated vested members and survivors of deceased members entitled to benefits but not yet receiving benefits	62,192	57,664
Terminated non-vested members and survivors of deceased members entitled to a refund of contributions	152,273	140,978
Retired members and survivors of deceased members currently receiving benefits	246,374	238,652
Total	763,132	742,565

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

The number of active members decreased by 0.8% from the previous valuation date.

The number of retired members and survivors of deceased members currently receiving benefits increased by 3.2% from the previous valuation.

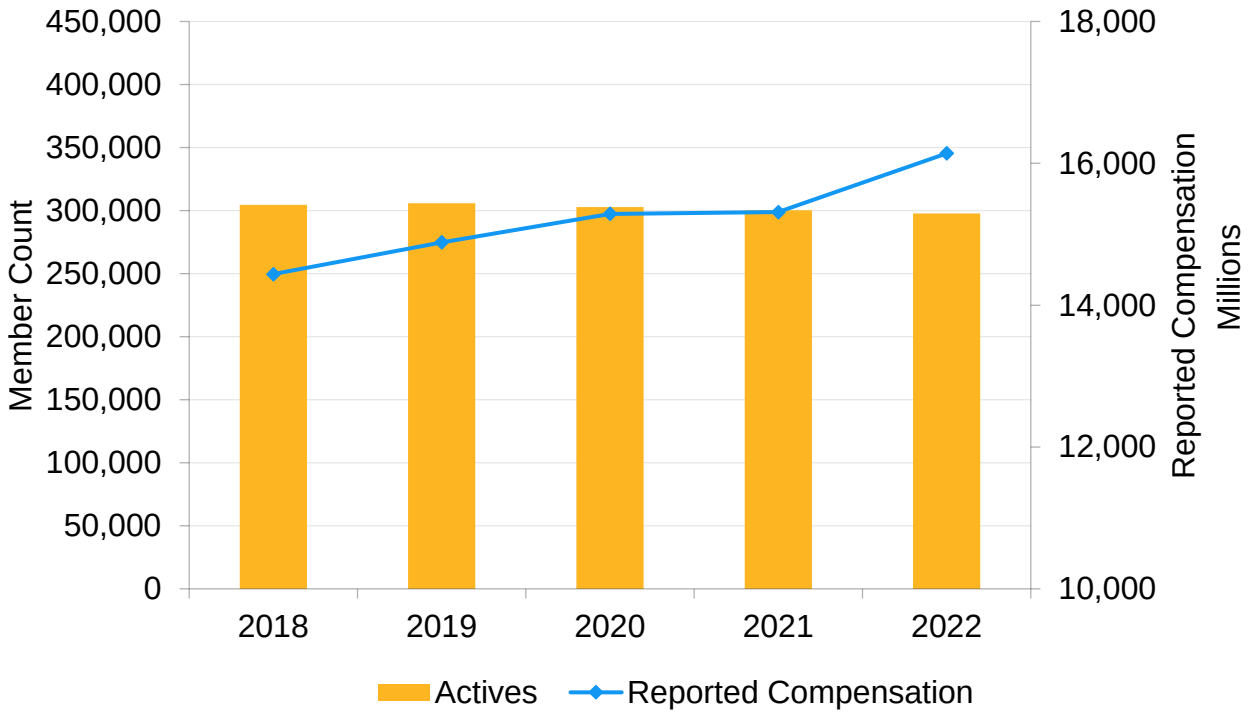
The increase in retiree population is consistent with expectations.

Valuation input

Actives

Membership Data	Asset Data	Benefit Provisions	Assumptions	Funding Methodology

The graph below provides a history of the number of active members and reported compensation over the past five years.



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

Reported compensation for active members for the year ending December 31, 2022 was $16.1 billion compared to $15.3 billion in the prior year, an increase of 5.3%.

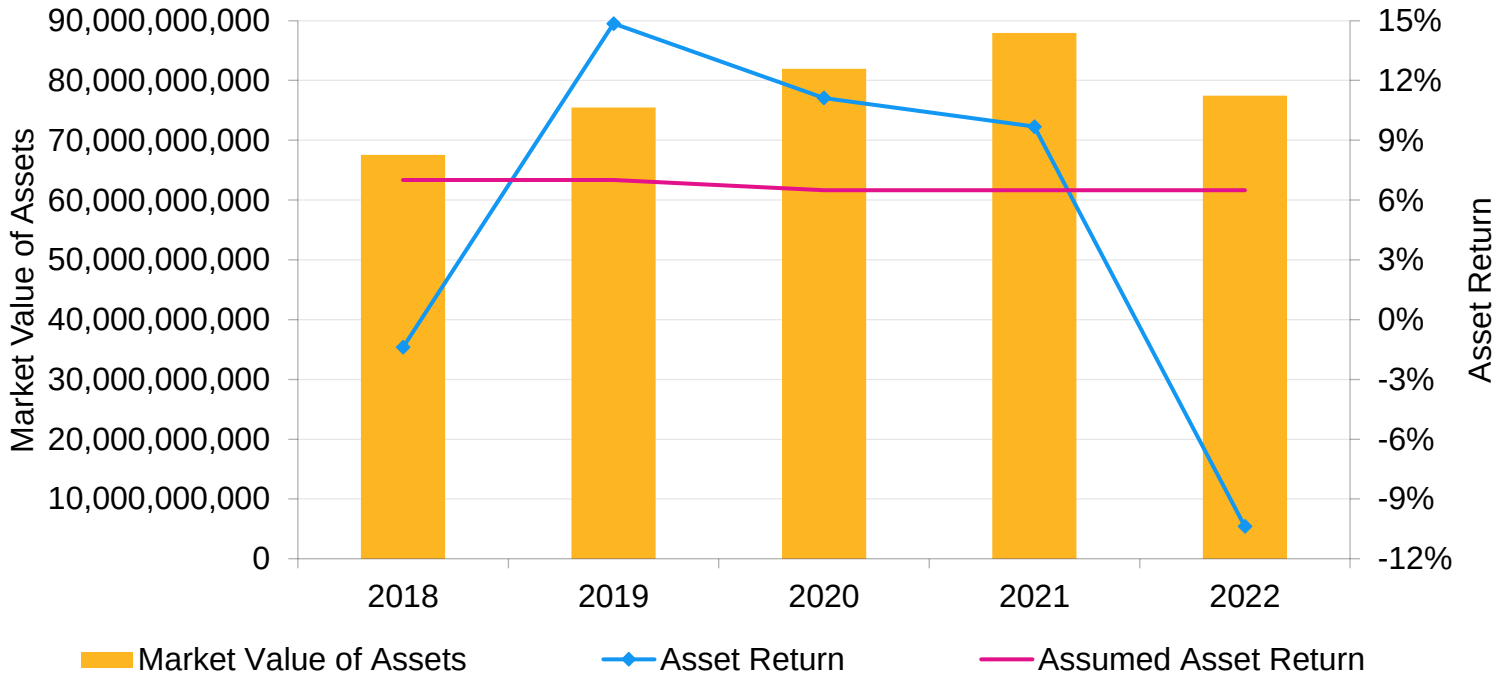
Covered payroll was expected to increase annually by 3.25%.

Payroll that is increasing faster than we assume results in more benefits accruing than we anticipate, but also more contributions supporting the system. Although the pay increases will ultimately lead to increases in the dollar amounts of contributions, the immediate effect on the December 31, 2022 actuarial valuation is a reduction in the funded ratio and an increase in required employer contribution rates compared to those anticipated in prior projections.

Valuation input

Historical market value and returns

The graph below provides a history of the market value of assets and asset returns over the past five years.



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

The investment return for the market value of assets for 2022 was (10.38)%, a negative return, which was well below the expected return of 6.50%.

The return on the actuarial value of assets, which is used to determine the contribution rates, was also below the 6.50% expected return at 4.53%.

This resulted in an increase in the unfunded actuarial accrued liability (UAAL) of $1.6 billion.

Market value returns have exceeded expectations three times in the last five years.

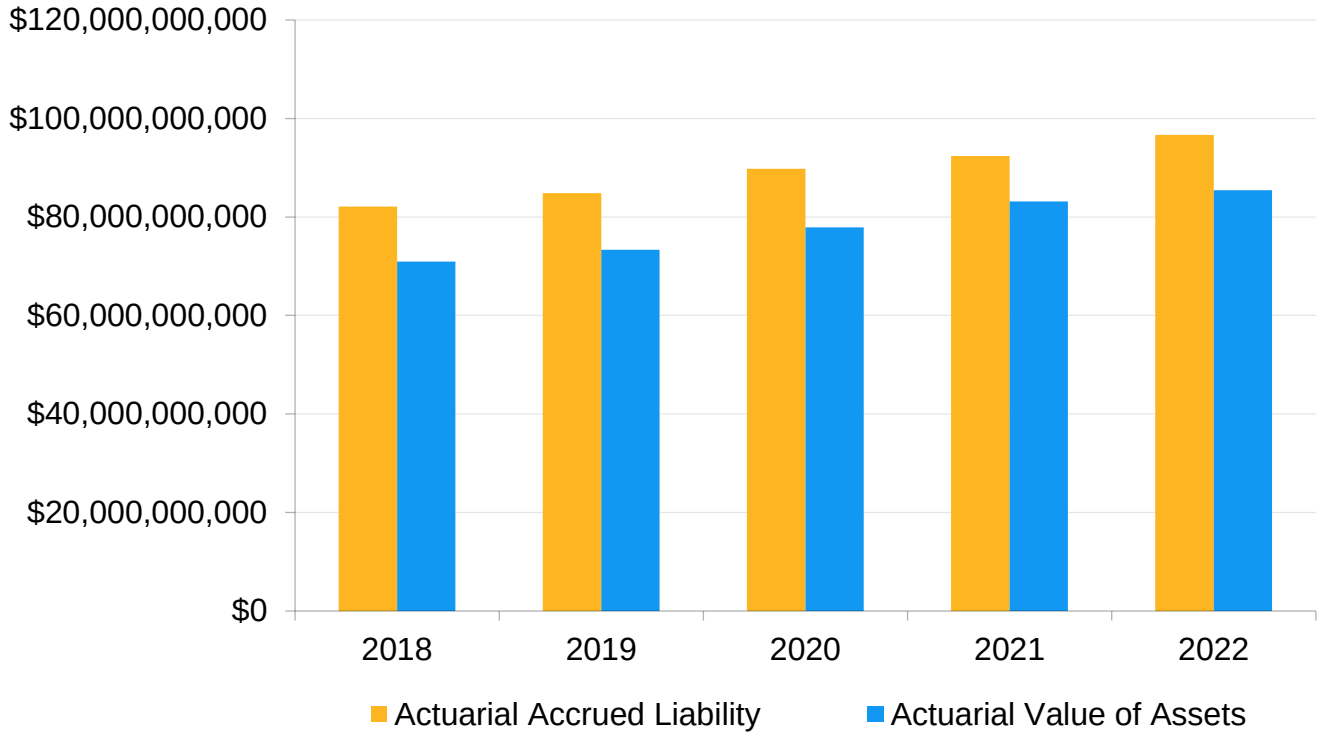
The annual rates of return on the actuarial value of assets have varied between 4.53% and 9.18% for the past five years.

Valuation results

Actuarial value of assets / actuarial accrued liability

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

The graph below provides a history of the actuarial accrued liability and actuarial value of assets.



Detailed summaries of the AVA and AAL are provided in Sections 3 and 4, respectively.

The difference in the actuarial accrued liability and the actuarial value of assets is known as the Unfunded Actuarial Accrued Liability (UAAL).

The UAAL is $11.3 billion as of 12/31/2022 and is to be paid off over a 12-year period.

Valuation results

Net actuarial gain or loss

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	$	9,217
Normal cost and administrative expense during 2022		1,887
Reduction due to actual contributions during 2022		(4,082)
Interest on UAAL, normal cost, and contributions		590
Asset (gain) / loss		1,625
Actuarial accrued liability (gain) / loss		1,824
Impact of assumption changes		0
Impact of benefit changes		207
Unfunded actuarial accrued liability (UAAL) as of 12/31/2022	$	11,268

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

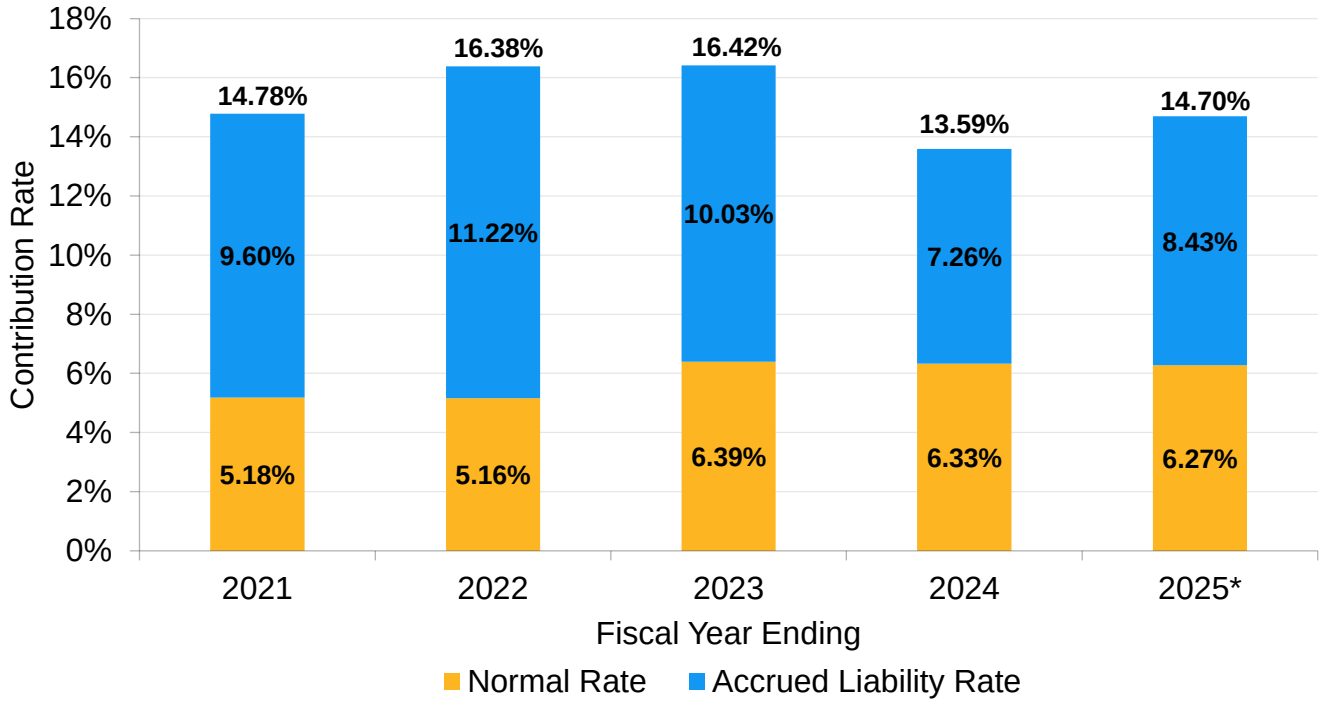
During 2022, the UAAL increased due to the asset loss of $1,625 million.

Additionally, changes in the census data, primarily higher-than-expected salary increases for continuing active members, increased the UAAL by $1,824 million.

Valuation results

Rates prior to application of ECRSP

The graph below provides a history of actuarially determined employer contribution rates over the past five years before applying funding policy minimums.



*Subject to the impact of future legislative changes effective before or during that fiscal year
A detailed summary of the actuarially determined employer contribution rates is provided in Section 5.

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 6% of pay member contributions.

The accrued liability rate is the payment toward the unfunded liability.

The actuarially determined employer contribution rate is the amount needed to pay for the cost of the benefits accruing and to pay off the unfunded liability over a 12-year period.

The 12-year period is a short period for Public Sector Retirement Systems in the United States, with the funding period for most of these Systems much longer. The shorter period results in higher contributions and more benefit security.

Valuation results

Employer contributions

The table below provides a reconciliation of the actuarially determined employer contribution rate shown as a percentage of covered payroll before applying the funding policy minimum.

Fiscal year ending June 30, 2024 Preliminary ADEC (based on December 31, 2021 valuation)	12.39%
Impact of benefit changes*	1.20%
Fiscal year ending June 30, 2024 Final ADEC	13.59%
Change due to anticipated reduction in UAAL**	(0.20%)
Change due to demographic (gain)/loss	1.05%
Change due to investment (gain)/loss	1.21%
Change due to contributions greater than ADEC	(0.49%)
Impact of assumption changes	0.00%
Impact of benefit changes	0.15%
Impact of Direct Rate Smoothing	0.59%
Reversal of one-time benefit changes	(1.20%)
Fiscal year ending June 30, 2025 Preliminary ADEC (based on December 31, 2022 valuation)	14.70%

* Includes the Legislated One-Time Pension Supplement of 1.20%.

** Amortization of the UAAL is determined as a level dollar amount with payments expected to remain the same over the amortization period but was calculated as a percentage of valuation payroll in the previous valuation. Payroll is expected to increase annually while the expected amortization payment does not increase. This causes the expected amortization payment to be a lesser percentage of the expected payroll.

The change in rate due to investment loss is based on the actuarial value of assets 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.

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

Valuation results

ECRSP

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

The Employer Contribution Rate Stabilization Policy (ECRSP) would result in a recommended contribution rate of 16.79% of payroll for fiscal year ending 2025.

- 15.90% is the actuarially determined employer contribution calculated in this most recent valuation prior to direct-rate smoothing.
- 14.70% is the actuarially determined employer contribution after direct-rate smoothing of the assumption and method changes.
- The minimum is 16.79%; the recommended appropriation from last year of 16.44% plus 0.35%
- The maximum is approximately 53.56%; the estimated actuarially determined employer contribution using a discount rate equal to the long-term treasury bond yield (3.97%).

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

The ECRSP adopted by the Board of Trustees on April 29, 2021, requires that recommended contributions be 0.35% of payroll greater than the recommended appropriation during the prior year, with the following bounds:

1) Contributions may not be less than the actuarially determined employer contribution (ADEC), and

2) Contributions may not be greater than a contribution determined using the same assumption used to calculate the ADEC based on the long-term treasury bond yield.

Valuation results

Potential COLA considerations

Benefit Enhancements	Additional Disclosures	Projections

- Note that the TSERS Board can *recommend* COLAs to the General Assembly; the Board does not have the authority to grant COLAs
- G.S. 135-5(o) has various provisions related to COLAs, including a description of a permanent COLA limited to 4% or inflation (whichever is less) when the cost would not require an increase in the employer contribution rate.
- Type of increase
  - Supplement payable October 2024
  - Permanent effective July 1, 2024
- Immediate or 12-year funding
  - Immediate funding recommended for Supplement
  - 12-year funding could be considered for Permanent
  - The contribution increase is added to the ECRSP rate per policy adopted at April 2021 Board meeting

A detailed summary of the cost of benefit enhancements is provided in Section 5.

Valuation results

Potential COLAs for fiscal year ending 2025

Benefit Enhancements	Additional Disclosures	Projections

- The December 31, 2022, valuation indicates an actuarial investment loss was incurred during 2022, and there are no investment gains available to support a recommendation of either of the following by the TSERS Board of Trustees.
  - a Cost-of-Living Adjustment (COLA) that would take effect on July 1, 2024; or
  - a one-time supplement to participants in receipt of benefits on September 1, 2024, payable October 2024.
- If granted by the General Assembly, the cost for a 1% COLA increase would be $560.8M, or an increase of 0.41% in the ADEC, payable over 12 years.
- If granted by the General Assembly, the cost of a one-time 1% supplement payment would be $56.6M, or an increase of 0.31% in the ADEC, payable over a single year.

Note: Buck cannot provide legal advice. Neither this slide, nor any other slide, should be interpreted as legal advice as to the Board's ability to provide a COLA to retirees or recommend a COLA to the legislature

A detailed summary of the cost of benefit enhancements is provided in Section 5.

Valuation results

Potential COLAs for fiscal year ending 2026

Benefit Enhancements	Additional Disclosures	Projections

- Based on the methods and assumptions used for the projections discussed later in the presentation, the standard conditions for the Board to consider proposing a potential COLA effective July 1, 2025, following the December 31, 2023, valuation would include the following minimal levels of investment return on market values of assets during 2023. Note, however, the ECRSP would require an increase in the employer contribution rate to cover the cost of a COLA.
  - If calendar year 2023 market value returns exceed 14.91% (or about $11.4B for TSERS), the plan is estimated to have an actuarial investment gain (rather than a loss) for 2023 and a COLA effective July 1, 2025, could be considered.
  - If calendar year 2023 market value returns exceed 18.56% (or about $14.2B for TSERS), the plan is estimated to have an actuarial investment gain (rather than a loss) for 2023 and such gain may be enough to consider providing a 1% COLA effective July 1, 2025.
    - Estimated actuarial investment gain of $560.8M
    - Estimated cost of 1% COLA payable to retirees effective July 1, 2025 of $560.8M.

Note: Buck cannot provide legal advice. Neither this slide, nor any other slide, should be interpreted as legal advice as to the Board's ability to provide a COLA to retirees or recommend a COLA to the legislature

A detailed summary of the cost of benefit enhancements is provided in Section 5.

Valuation results

Projections

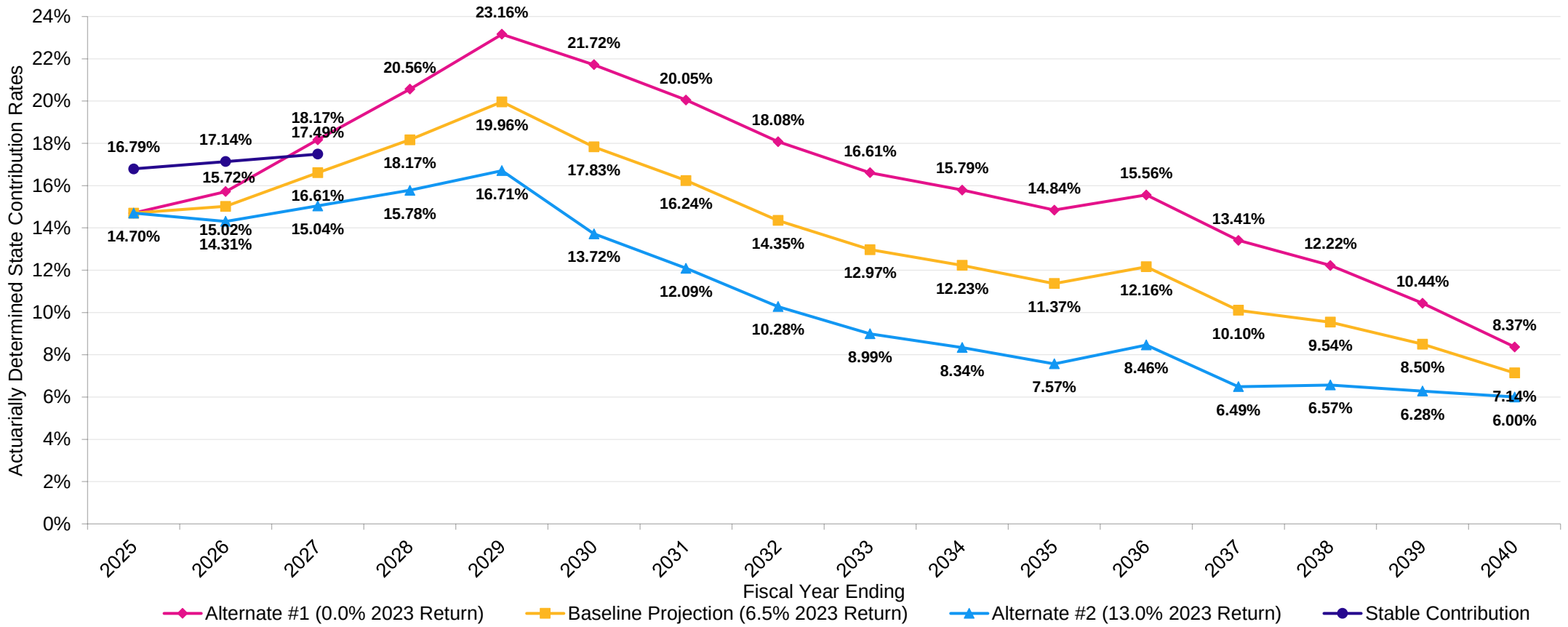
- Projections of contribution requirements and funded status into the future can be helpful planning tools for stakeholders. This section provides such projections. The projections of the actuarial valuation are known as deterministic projections. Deterministic projections are based on one scenario in the future. The baseline deterministic projection is based on December 31, 2022 valuation results as assumptions.
- Key Projection Assumptions
  - Valuation interest rate of 6.50%
  - Direct-rate smoothing of the change in the employer contribution rate due to the changes in assumption and methods over a 5-year period beginning July 1, 2022
  - 6.50% investment return on market value of assets
  - Actuarial assumptions and methods as described in Appendix C. All future demographic experience is assumed to be exactly realized.
  - The contribution rate under the Employer Contribution Rate Stabilization Policy (ECRSP) is contributed until fiscal year ending 2027.
  - The actuarially determined employer contribution rate is contributed for fiscal years ending 2028 and beyond.
  - The employer contribution shall not be less than the employee contribution, which is currently 6%.
  - 0% increase in the total active member population
  - No cost-of-living adjustments granted
  - Future pay increases based on long-term salary increase assumptions
- The ECRSP contribution rate is the Stable Contribution rate shown in the projections. See Appendix F for more detail on the ECRSP.
- In addition, we have provided two alternate deterministic projections. The first alternate deterministic projection is based on the same assumptions as the baseline deterministic projection except that it assumes a 0.0% asset return for calendar year 2023. The second alternate deterministic projection is based on the same assumptions as the baseline deterministic projection except that it assumes a 13.0% asset return for calendar year 2023.

A detailed summary of the deterministic projections is provided in Section 6.

Valuation results

Projected contribution rates

Benefit Enhancements | **Additional Disclosures** | **Projections**

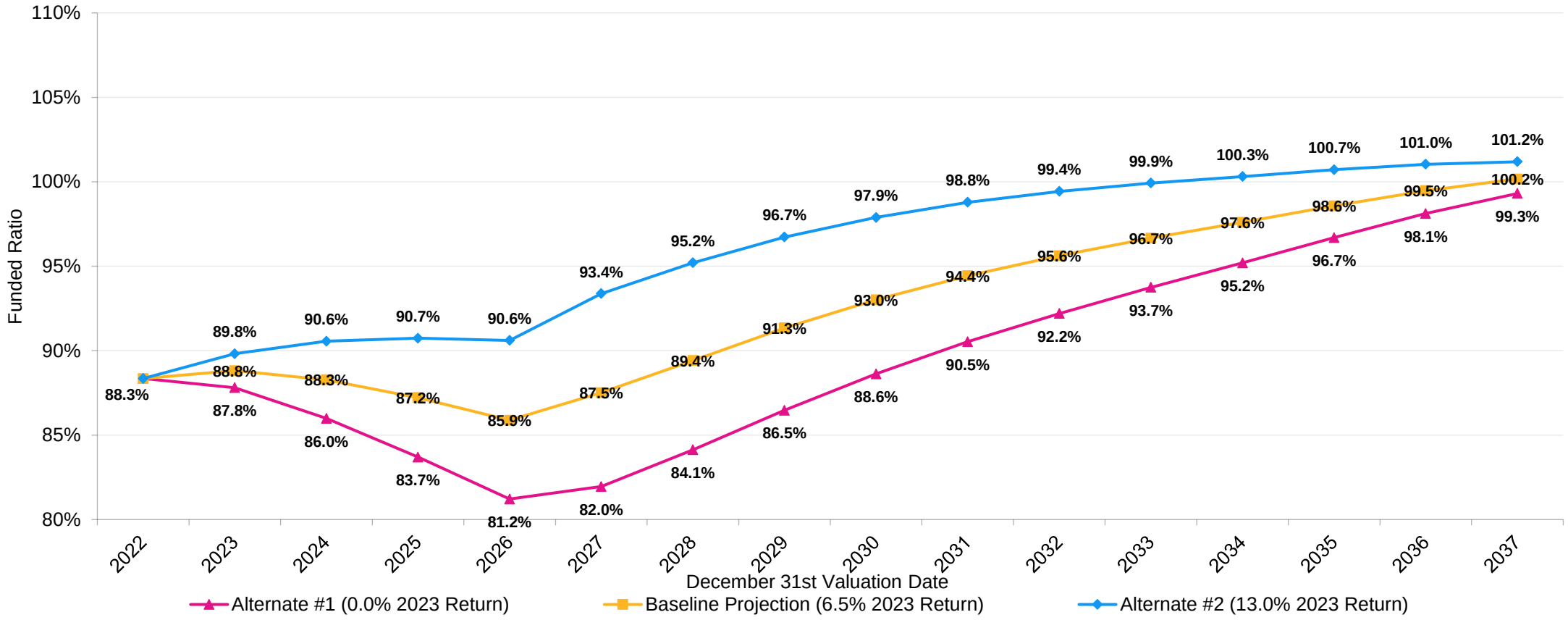


A detailed summary of the deterministic projections is provided in Section 6.

Valuation results

Projected funded ratio

Benefit Enhancements | **Additional Disclosures** | **Projections**



A detailed summary of the deterministic projections is provided in Section 6.

Key takeaways

- Key results of the December 31, 2022 valuation were:
  - Market value returns of (10.38)% during calendar year 2022 compared to 6.50% assumed
  - Liabilities $1.8 billion higher than anticipated as of December 31, 2022, primarily from higher-than-expected salary increases for continuing active members
  - Recent legislation signed into law since the prior valuation
    - One-time supplement payment for TSERS payees of 4% of their annual retirement allowance, payable by November 2023
  - 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

Key takeaways (continued)

- When compared to the December 31, 2021 baseline projections, the above resulted in:
  - A lower funded ratio as of December 31, 2022 (88.3% in the valuation compared to 93.0% in the prior year's baseline projection)
  - A higher actuarially determined employer contribution rate prior to applying the Employer Contribution Rate Stabilization Policy (ECRSP) for fiscal year ending June 30, 2025 (14.70% in the valuation compared to 11.62% in the prior year's baseline projection)
  - Investment losses during the 2022 plan year combined with demographic losses have pushed the projected date of attaining a 100% funded ratio from FYE 2024 to FYE 2037

Key takeaways (continued)

- TSERS is well funded compared to its peers. This is due to:
  - Stakeholders working together to keep TSERS 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, which typically only provides benefit increases when certain financial conditions are met, supports the health of the system
  - Modest changes in benefits when compared to peers
- As has been done for over 80 years, continued focus on these measures will be needed to maintain the sustainability of TSERS well into the future

Certification

Future actuarial measurements may differ significantly from current measurements due to plan experience differing from that anticipated by the economic and demographic assumptions, increases or decreases expected as part of the natural operation of the methodology used for these measurements, and changes in plan provisions or applicable law. 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. 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 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.

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.

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

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

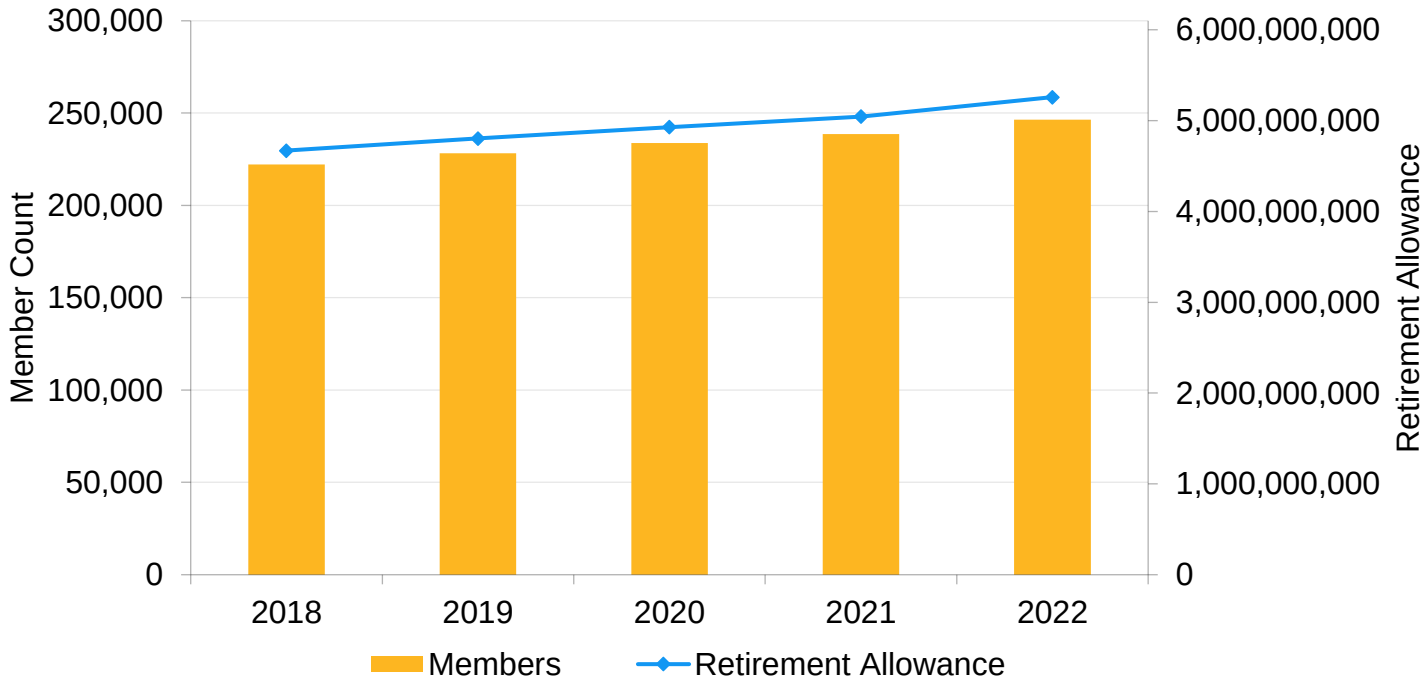
Appendix I

Supplemental information

Valuation input

Retirees and survivors receiving benefits

The graph below provides a history of the number of retired members and survivors of deceased members and benefit amounts payable over the past five years.



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

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

Valuation input

Market value

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	$ 87,966,352,518	$ 81,969,425,086
Employer contributions	3,039,949,206	2,403,844,588
Employee contributions	1,042,052,173	995,528,156
Benefit payments other than refunds	(5,407,203,621)	(5,123,832,896)
Refunds	(125,034,315)	(111,847,477)
Administrative expenses	(14,583,835)	(13,985,883)
Investment income	(9,056,295,198)	7,847,220,944
Net increase / (decrease)	(10,521,115,590)	5,996,927,432
End of year market value of assets	$ 77,445,236,928	$ 87,966,352,518
Estimated net investment return	-10.38%	9.68%

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

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

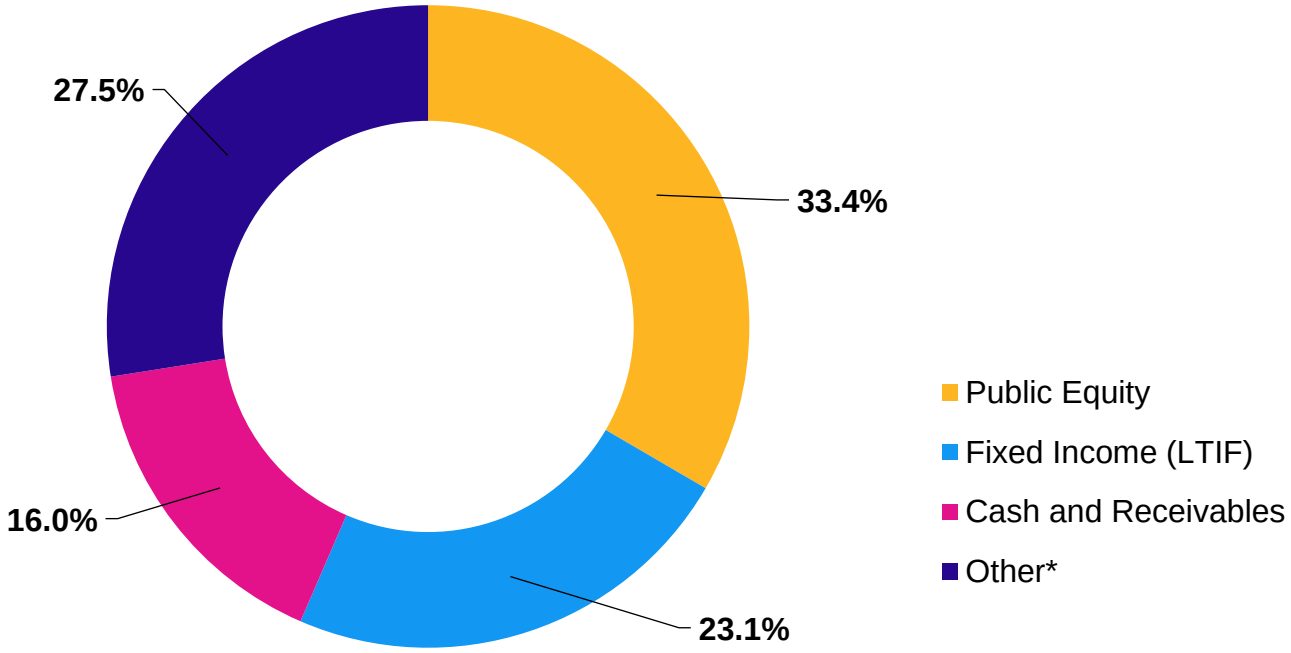
Incoming contributions currently cover over 70% of outgoing benefit payments and administrative expenses.

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 input

Asset allocation

The graph below provides the breakdown of the market value of assets on December 31, 2022 by asset category.



*Real estate, alternatives, inflation, and credit
A detailed summary of the market value of assets is provided in Section 3.

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

Valuation input

Benefit provisions

Membership Data	Asset Data	Benefit Provisions	Assumptions	Funding Methodology

Benefit provisions are described in North Carolina General Statutes, Chapter 135, Article 1.

- Since the prior valuation, the legislature enacted a one-time supplement for TSERS payees equal to 4% of the member's annual retirement 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.
- No other significant changes in benefit provisions from the prior year's valuation.

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

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 TSERS due to the legislature contributing at least the actuarially determined employer contribution on the basis of an actuarially sound funding policy, benefit cuts have not been needed in North Carolina as they have been in most other states.

Valuation input

Actuarial Assumptions

Membership Data	Asset Data	Benefit Provisions	Assumptions	Funding Methodology

Actuarial assumptions bridge the gap between the information that we know with certainty as of the valuation date and what may happen in the future. The assumptions used include the following:

- Demographic
  - Retirement
  - Termination
  - Disability
  - Death
- Economic
  - Interest rate – 6.50% per year
  - Salary increase (individual, varies by service and job type)
  - Inflation – 2.50%
  - Real wage growth – 0.75%

A detailed summary of the actuarial assumptions and methods is provided in Appendix C.

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.

Valuation input

Actuarial cost method

Membership Data	Asset Data	Benefit Provisions	Assumptions	Funding Methodology

The Funding Methodology is the payment plan for TSERS and is composed of the Actuarial Cost Method, the Asset Valuation Method and Amortization Method.

- Actuarial Cost Methods allocate costs to the actuarial accrued liability (i.e., the amount of money that should be in the fund) for past service and normal cost (i.e., the cost of benefits accruing during the year) for current service.
  - The Board of Trustees has adopted Entry Age Normal as its actuarial cost method
  - This method develops normal costs that stay level as a percent of payroll

A detailed summary of the actuarial assumptions and methods is provided in Appendix C.

The following “Objectives and Principles for Funding Public Sector Pension Plans” provides information on funding of Public Plans: https://www.actuary.org/sites/default/files/files/Public-Plans_IB-Funding-Policy_02-18-2014.pdf.

Page 15 of the following : https://www.ccactuaries.org/docs/default-source/papers/cca-ppc_actuarial-funding-policies-and-practices-for-public-pension-plans.pdf - denotes Entry Age Normal as a model practice for cost methods.

Valuation input

Asset valuation method

Membership Data	Asset Data	Benefit Provisions	Assumptions	Funding Methodology

The Funding Methodology is the payment plan for TSERS and is composed of the Actuarial Cost Method, the Asset Valuation Method and Amortization Method.

- Asset Valuation Methods smooth or average the market value returns over time to alleviate contribution volatility that results from market returns.
  - Asset returns in excess of or less than the expected return on market value of assets reflected over a five-year period
  - Assets corridor: not greater than 120% of market value and not less than 80% of market value

A detailed summary of the actuarial assumptions and methods is provided in Appendix C.

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https://www.ccactuaries.org/docs/default-source/papers/cca-ppc_actuarial-funding-policies-and-practices-for-public-pension-plans.pdf- denotes the policy being used is an acceptable policy.

Almost all Public Sector Retirement Systems in the United States use asset valuation methods to alleviate contribution volatility. The use of a four- or five-year period is most common.

Valuation input

Amortization method

Membership Data	Asset Data	Benefit Provisions	Assumptions	Funding Methodology

The Funding Methodology is the payment plan for TSERS and is composed of the Actuarial Cost Method, the Asset Valuation Method and Amortization Method.

- Amortization Methods determine the payment schedule for unfunded actuarial accrued liability (i.e., the difference between the actuarial accrued liability and actuarial value of assets)
  - Payment level: the payment is determined as a level dollar amount, like a mortgage payment
  - Payment period: a 12-year closed amortization period was adopted for fiscal year ending 2012. A new amortization base is created each year based on the prior years' experience.
- For fiscal years beginning after January 1, 2017, the sum of the "normal contribution" and the "accrued liability contribution" shall not be less than the employee contribution.

A detailed summary of the actuarial assumptions and methods is provided in Appendix C.

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https://www.ccactuaries.org/docs/default-source/papers/cca-ppc_actuarial-funding-policies-and-practices-for-public-pension-plans.pdf- suggests the Amortization Method is an acceptable practice.

When compared to other Public Sector Retirement Systems in the United States, the Amortization Method results in higher pension debt payments. This is because of:

- A shorter period of 12 years compared to a national average of 21*
- Level dollar payments instead of payments designed to increase, which is more typical in the Public Sector

* NASRA, April 2022, *Overview of Public Pension Plan Amortization Policies*

Valuation results

Actuarial value of assets

The table below provides the calculation of the Actuarial Value of Assets (AVA) at the valuation date.

Asset data as of	12/31/2022
Beginning of year actuarial value of assets	$ 83,139,458,098
Beginning of year market value of assets	87,966,352,518
Total contributions	4,082,001,379
Benefit payments, refunds and administrative expenses	(5,546,821,771)
Net cash flow	(1,464,820,392)
Expected investment return	5,670,955,694
Expected end of year market value of assets	92,172,487,820
End of year market value of assets	77,445,236,928
Excess market value over expected market value of assets	(14,727,250,892)
80% of 2022 asset gain/(loss)	(11,781,800,714)
60% of 2021 asset gain/(loss)	1,547,037,715
40% of 2020 asset gain/(loss)	1,228,468,748
20% of 2019 asset gain/(loss)	1,044,646,796
Total deferred asset gain/(loss)	(7,961,647,455)
Preliminary end of year actuarial value of assets	85,406,884,383
Final end of year actuarial value of assets (not less than 80% and not greater than 120% of market value)	85,406,884,383
Estimated net investment return on actuarial value	4.53%

A detailed summary of the Actuarial Value of Assets is provided in Section 3.

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 $1.6 billion during 2022.

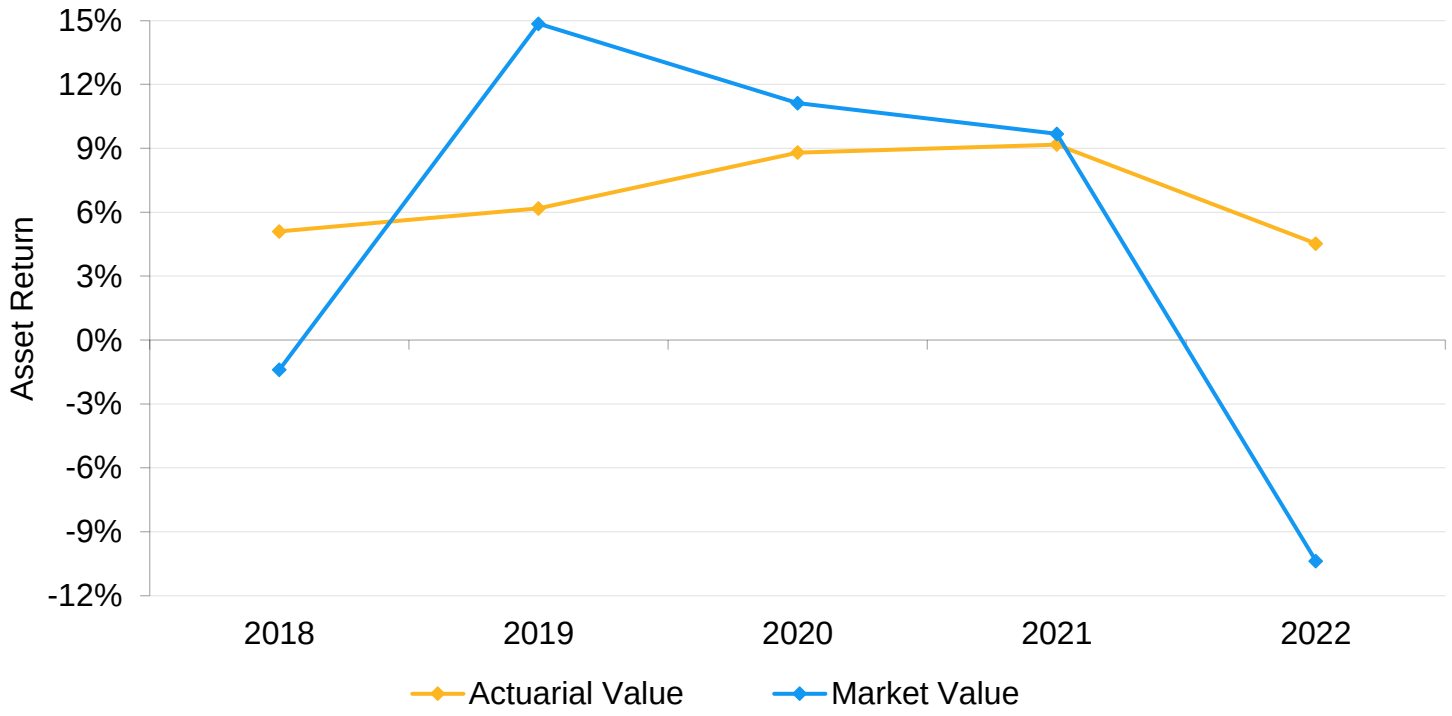
The assets at actuarial value were $11.3 billion less than the actuarial accrued liability as of December 31, 2022.

Valuation results

Five-year return history

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

The graph below provides a history of the market value and actuarial value of assets over the past five years.



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

The investment return for the market value of assets for calendar year 2022 was (10.38)%.

The actuarial value of assets smooths investment gains and losses.

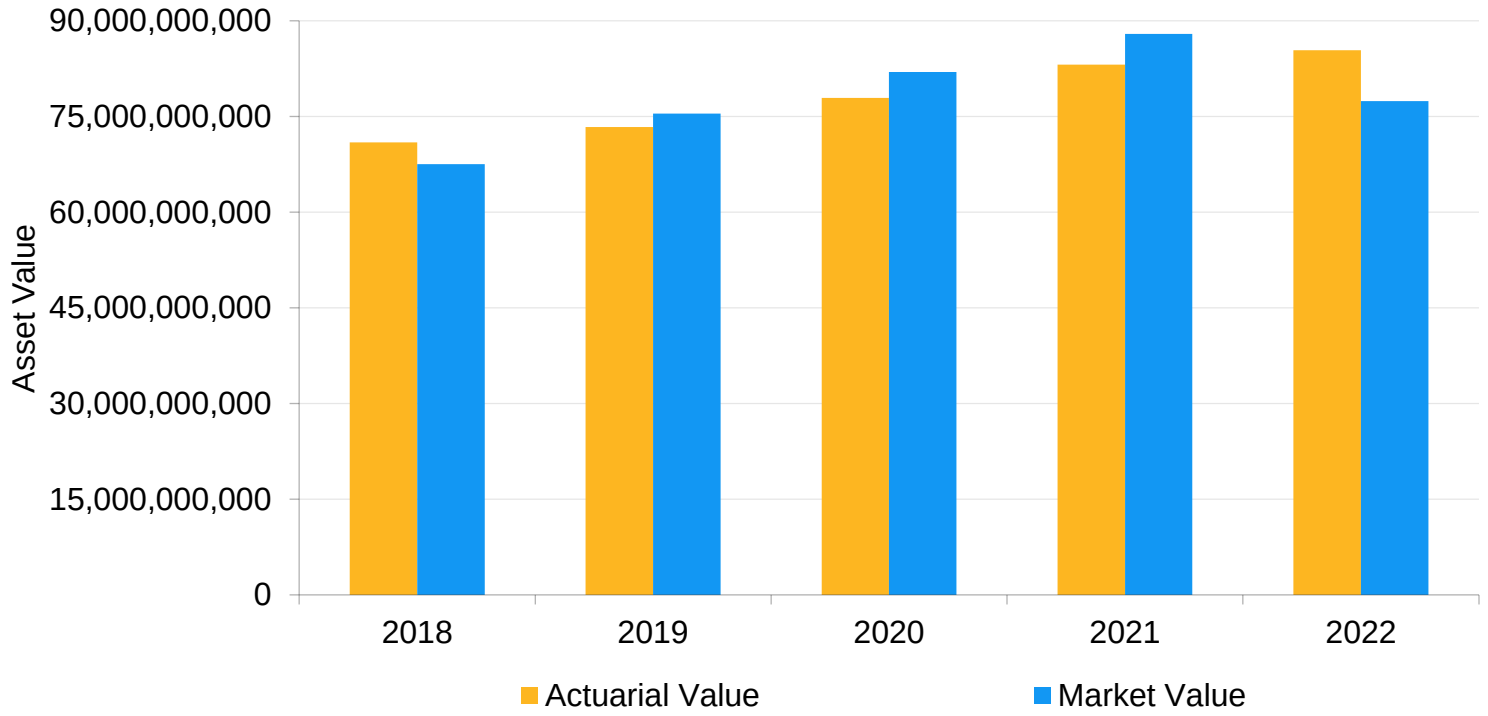
The lower-than-expected market return in 2022, partially offset by higher-than-expected market returns in 2019, 2020, and 2021, resulted in an actuarial value of asset return for calendar year 2022 of 4.53% and a recognized actuarial asset loss of $1.6 billion during 2022.

The assets at actuarial value were $11.1 billion less than the actuarial accrued liability as of December 31, 2022.

Valuation results

Comparison to market values

The graph below provides a history of the market value and actuarial value of assets over the past five years.



A detailed summary of the Actuarial Value of Assets is provided in Section 3.

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.

In fact, if the investments earn the expected 6.50% per year over the next four years, a loss will be recognized each of those years.

Valuation results

Comparison to market returns

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

Calendar Year	Expected Asset Return	Actuarial Value of Asset Return	Market Value of Asset Return	20 Year Average Market Return
2003	7.25%	7.98%	18.23%	NA
2004	7.25%	8.56%	10.73%	NA
2005	7.25%	8.26%	6.97%	NA
2006	7.25%	8.94%	11.41%	NA
2007	7.25%	8.87%	8.38%	NA
2008	7.25%	2.89%	-19.50%	NA
2009	7.25%	4.74%	14.84%	NA
2010	7.25%	5.89%	11.47%	NA
2011	7.25%	5.15%	2.19%	NA
2012	7.25%	6.32%	11.82%	NA
2013	7.25%	7.43%	12.21%	NA
2014	7.25%	7.19%	6.21%	NA
2015	7.25%	5.87%	0.36%	6.86%
2016	7.25%	5.32%	6.22%	6.71%
2017	7.25%	6.56%	13.49%	6.49%
2018	7.20%	5.10%	-1.39%	5.60%
2019	7.00%	6.18%	14.85%	5.82%
2020	7.00%	8.80%	11.12%	6.25%
2021	6.50%	9.18%	9.68%	6.84%
2022	6.50%	4.53%	-10.38%	6.54%
20-Yr Average	7.13%	6.67%	6.54%	NA
Range	0.75%	6.29%	37.73%	NA

A detailed summary of the Actuarial Value of Assets is provided in Section 3.

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 past 20 years of 6.67% compares with an average market return of 6.54%.

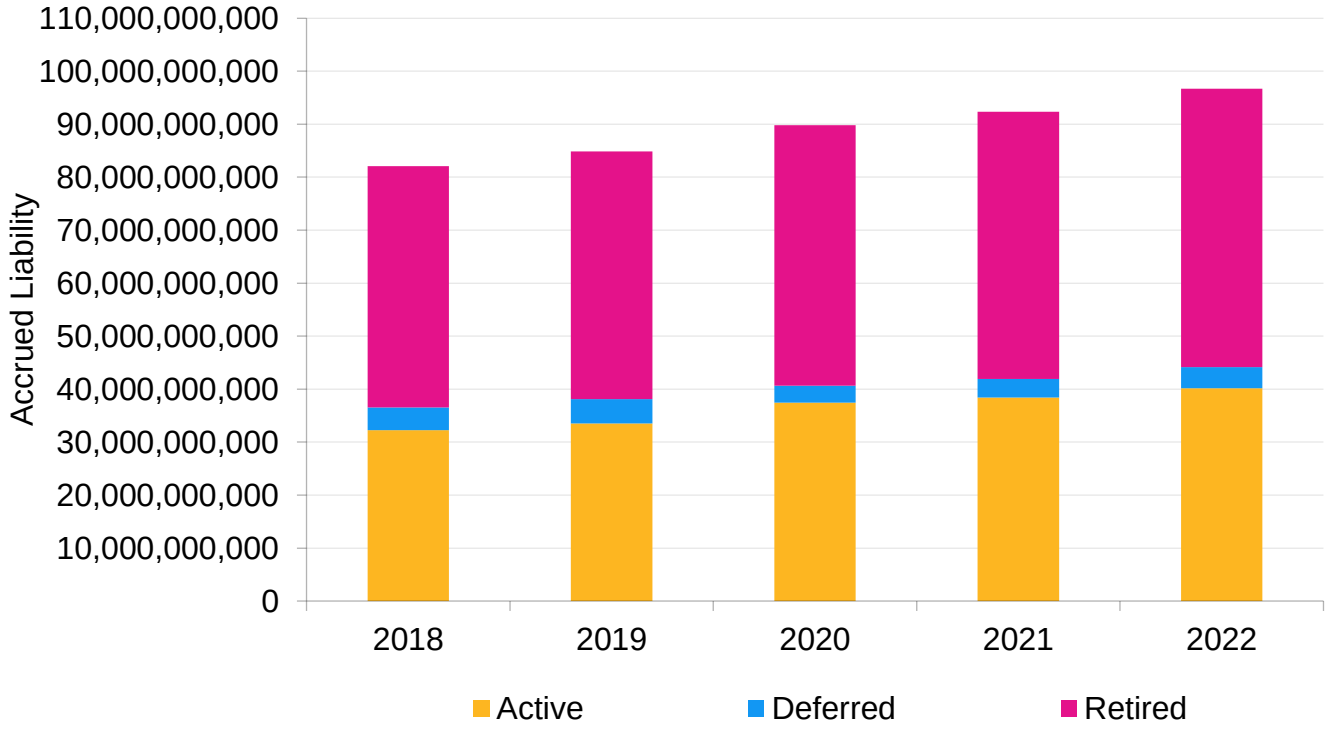
The range of returns is markedly more volatile in the market value of assets at 37.73% versus 6.29% for actuarial value.

Using the actuarial value of assets versus market value results in much lower employer contribution volatility, while ensuring that the actuarial needs of TSERS are met.

Valuation results

Actuarial accrued liability

The graph below provides a history of the actuarial accrued liability (AAL) over the past five years.



A detailed summary of the Actuarial Accrued Liability is provided in Section 4.

The AAL increased from $92.4 billion to $96.7 billion during 2022.

The Retirement System is an open plan, which means that new members enter the plan each year.

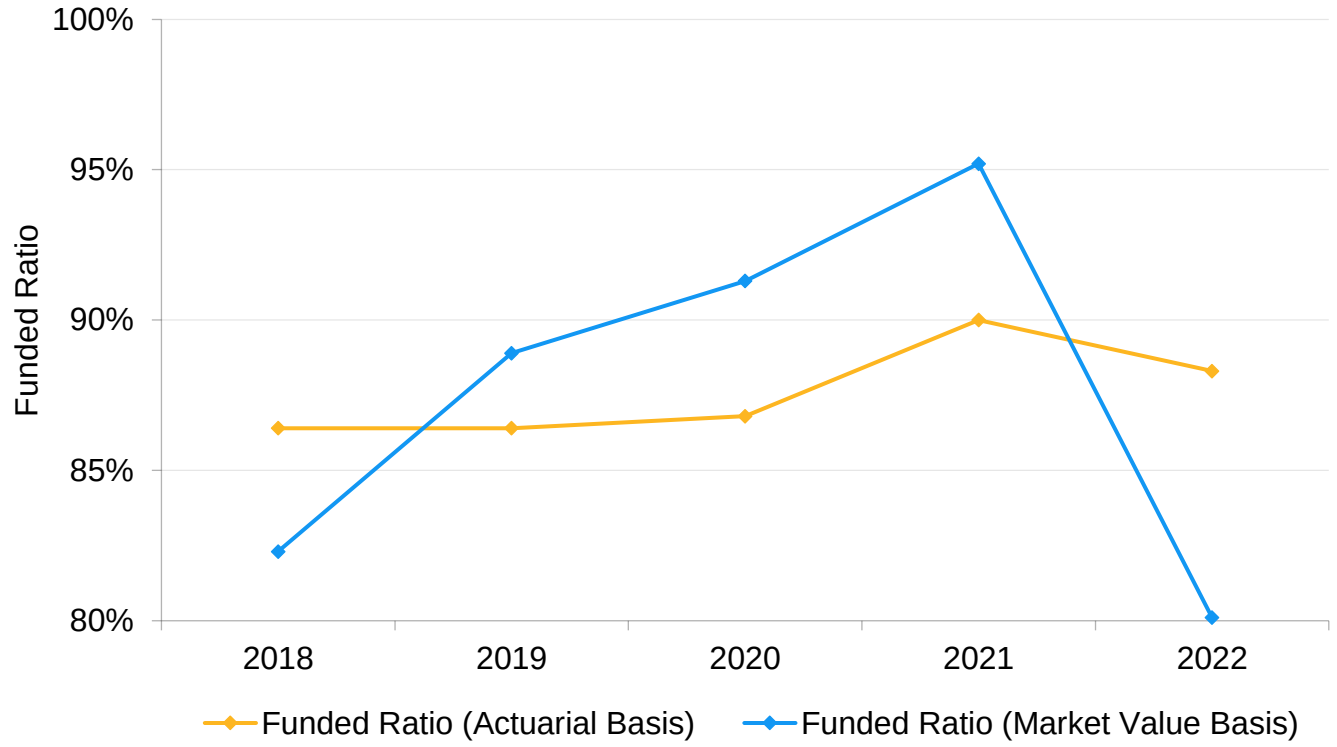
In an open plan, liabilities are expected to grow from one year to the next as more benefits accrue and the membership approaches retirement.

The AAL was $1,824 million higher than expected, resulting primarily from higher-than-expected salary increases for continuing active members.

Valuation results

Funded ratio

The graph below provides a history of the funded ratio on a market and actuarial basis over the past five years.



A detailed summary of the funded ratio is provided in Section 4.

The ratio of assets to liabilities shows the health of the plan on an accrued basis.

The actuarial value of assets basis is used for computing contributions to alleviate contribution volatility.

The funded ratio on an actuarial basis decreased from 90.0% on December 31, 2021 to 88.3% on December 31, 2022.

Valuation results

History of rates and appropriations

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	Effect of Direct Rate Smoothing	Legislated Benefit Cost*	ULSR Contribution G.S. 143C-4-10(e)	ADEC Prior to Applicable Funding Policy	ADEC under ECRSP	Appropriated Rate
12/31/2022	06/30/2025	6.27%	9.63%	(1.20%)	N/A	N/A	N/A	N/A	N/A
12/31/2021	06/30/2024	6.33%	7.85%	(1.79%)	1.20%	0.00%	13.59%	17.64%	17.64%
12/31/2020	06/30/2023	6.39%	11.13%	(2.39%)	1.24%	0.05%	16.42%	17.38%	17.38%
12/31/2019	06/30/2022	5.16%	10.58%	0.00%	0.64%	0.00%	16.38%	16.38%	16.38%
12/31/2018	06/30/2021	5.18%	10.19%	(0.59%)	0.00%	0.00%	14.78%	14.78%	14.78%
12/31/2017	06/30/2020	5.17%	8.99%	(1.19%)	0.00%	0.00%	12.97%	12.97%	12.97%

* 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 one-time supplement equal to 2% of the annual retirement allowance payable in December 2021.

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

The appropriated rate for fiscal year ending 2024 is 17.64% of payroll.

The ADEC for fiscal year ending 2025 is 14.70% of payroll before applying the ECRSP and 16.79% of payroll after applying the ECRSP, without regard to any legislated changes to the rate.

Valuation results

Additional disclosures

Benefit Enhancements | Additional Disclosures | Projections

The table below illustrates the sensitivity of certain valuation results to changes in the discount rate on a market value of assets basis. All numbers rounded to billions*

Discount Rate	3.97%	5.24%	6.50%	7.76%	9.03%
Market Value of Assets	$ 77.45	$ 77.45	$ 77.45	$ 77.45	$ 77.45
Actuarial Accrued Liability	131.88	112.00	96.68	84.56	74.97
Unfunded Accrued Liability (UAAL)	$ 54.44	$ 34.55	$ 19.23	$ 7.11	$ (2.48)
Funded Ratio	58.7%	69.1%	80.1%	91.6%	103.3%
20-Year Amortization of UAAL	$ 4.15	$ 2.98	$ 1.86	N/A	N/A
(as % of general state revenue)	9.4%	6.8%	4.2%	N/A	N/A

*Numbers may not add due to rounding.

A detailed summary of the additional disclosures is provided in Appendix D.

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.

The 30-year Treasury rate is 3.97% as of December 31, 2022.

The difference between the UAAL measured at 6.50% and 3.97% is $35.2 billion on December 31, 2022.

Valuation results

Additional disclosures

Benefit Enhancements | **Additional Disclosures** | **Projections**

The table below provides an estimate of future market value of asset returns based on the study commissioned by the DST Investment Management Division and presented by Callan to the Investment Advisory Committee on February 23, 2022.

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%

A detailed summary of the additional disclosures is provided in Appendix D.

These results are summarized in the "NCRS Investment Policy Statement Review" presentation prepared by the DST Investment Management Division and dated May 25, 2022.

Based on the study, 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.

Valuation results

Projections

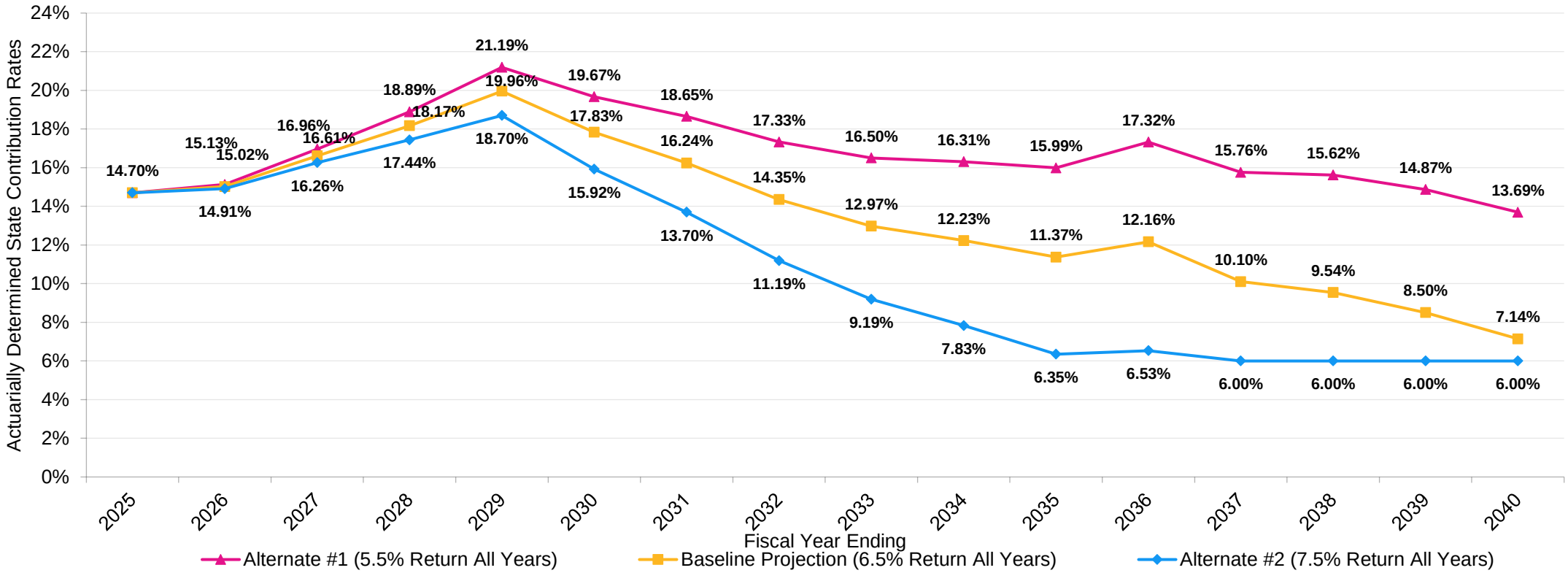
Benefit Enhancements	Additional Disclosures	Projections

The baseline projection uses the same basis described earlier in this presentation. The alternate deterministic projections are based on the same assumptions as the baseline deterministic projection except that they assume a 5.50%/7.50% investment return on market value of assets for all calendar years starting in 2023.

Valuation results

Projected contribution rates

Benefit Enhancements | **Additional Disclosures** | **Projections**

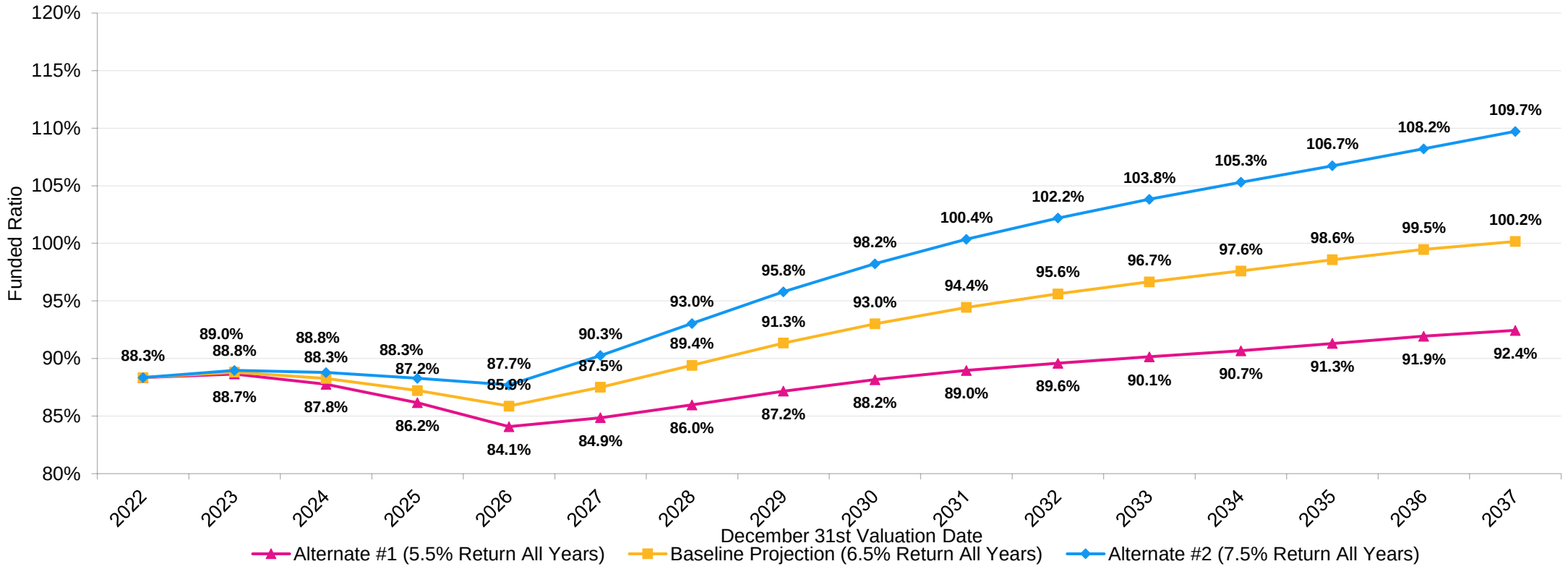


Projected contribution rates Alternate Projection #1 assumes 5.50% asset returns every year starting in 2023 compared to the 6.50% assumption in the Baseline Projection. As a result, the unfunded accrued liability will be higher resulting in higher projected contributions. The converse is true for Alternate Projection #2.

Valuation results

Projected funded ratio

Benefit Enhancements | **Additional Disclosures** | **Projections**



Projected contribution rates Alternate Projection #1 assumes 5.50% asset returns every year starting in 2023 compared to the 6.50% assumption in the Baseline Projection. As a result, the unfunded accrued liability will be higher resulting in a lower projected funded ratio. The converse is true for Alternate Projection #2.

Appendix II

Data for Graphs

Valuation input

Historical market value and returns

Market Value of Assets and Asset Return

	Market Value of Assets	Asset Return
2018	$ 67,536,480,309	-1.39%
2019	75,486,780,473	14.85%
2020	81,969,425,086	11.12%
2021	87,966,352,518	9.68%
2022	77,445,236,928	-10.38%

Valuation results

Five-year return history

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

Asset Returns

	Actuarial Value	Market Value
2018	5.10%	-1.39%
2019	6.18%	14.85%
2020	8.80%	11.12%
2021	9.18%	9.68%
2022	4.53%	-10.38%

Valuation results

Actuarial value of assets / actuarial accrued liability

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

Actuarial Accrued Liability and Actuarial Value of Assets

	Actuarial Accrued Liability	Actuarial Value of Assets
2018	$ 82,105,943,131	$ 70,959,093,440
2019	84,873,315,272	73,353,759,963
2020	89,809,074,074	77,922,070,039
2021	92,356,225,906	83,139,458,098
2022	96,675,255,859	85,406,884,383

Valuation results

Rates prior to application of ECRSP

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

Actuarially Determined Employer Contribution Rates

Fiscal Year Ending	Normal Rate	Accrued Liability Rate	Total Rate
2021	5.18%	9.60%	14.78%
2022	5.16%	11.22%	16.38%
2023	6.39%	10.03%	16.42%
2024	6.33%	7.26%	13.59%
2025*	6.27%	8.43%	14.70%

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

Valuation results

Projected contribution rates

Benefit Enhancements | Additional Disclosures | Projections

Projected Actuarially Determined Employer Contribution Rates

	Alternate #1 (0.0% 2023 Return)	Baseline Projection	Alternate #2 (13.0% 2023 Return)
2025	14.70%	14.70%	14.70%
2026	15.72%	15.02%	14.31%
2027	18.17%	16.61%	15.04%
2028	20.56%	18.17%	15.78%
2029	23.16%	19.96%	16.71%
2030	21.72%	17.83%	13.72%
2031	20.05%	16.24%	12.09%
2032	18.08%	14.35%	10.28%
2033	16.61%	12.97%	8.99%
2034	15.79%	12.23%	8.34%
2035	14.84%	11.37%	7.57%
2036	15.56%	12.16%	8.46%
2037	13.41%	10.10%	6.49%
2038	12.22%	9.54%	6.57%
2039	10.44%	8.50%	6.28%
2040	8.37%	7.14%	6.00%

Valuation results

Projected funded ratio

Benefit Enhancements | Additional Disclosures | Projections

Projected Funded Ratio

	Alternate #1 (0.0% 2023 Return)	Baseline Projection	Alternate #2 (13.0% 2023 Return)
2022	88.3%	88.3%	88.3%
2023	87.8%	88.8%	89.8%
2024	86.0%	88.3%	90.6%
2025	83.7%	87.2%	90.7%
2026	81.2%	85.9%	90.6%
2027	82.0%	87.5%	93.4%
2028	84.1%	89.4%	95.2%
2029	86.5%	91.3%	96.7%
2030	88.6%	93.0%	97.9%
2031	90.5%	94.4%	98.8%
2032	92.2%	95.6%	99.4%
2033	93.7%	96.7%	99.9%
2034	95.2%	97.6%	100.3%
2035	96.7%	98.6%	100.7%
2036	98.1%	99.5%	101.0%
2037	99.3%	100.2%	101.2%

Valuation input

Actives

Membership Data	Asset Data	Benefit Provisions	Assumptions	Funding Methodology

Active Members

	Active Member Count	Reported Compensation
2018	304,575	$ 14,436,435,848
2019	305,962	14,886,467,797
2020	302,771	15,287,665,011
2021	300,310	15,312,224,584
2022	297,802	16,141,902,861

Valuation input

Retirees and survivors receiving benefits

Retired Members and Survivors of Deceased Members

	Retired and Survivors of Deceased Member Count	Retirement Allowance
2018	222,084	$ 4,668,925,869
2019	228,291	4,804,178,473
2020	233,751	4,927,686,580
2021	238,652	5,044,817,043
2022	246,374	5,258,568,393

Valuation results

Comparison to market values

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

Actuarial Value and Market Value of Assets

	Actuarial Value of Assets	Market Value of Assets
2018	$ 70,959,093,440	$ 67,536,480,309
2019	73,353,759,963	75,486,780,473
2020	77,922,070,039	81,969,425,086
2021	83,139,458,098	87,966,352,518
2022	85,406,884,383	77,445,236,928

Valuation results

Actuarial accrued liability

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

Actuarial Accrued Liability

	Liability for Active Members	Liability for Deferred Members	Liability for Retired Members	Total Liability
2018	$ 32,234,081,882	$ 4,337,483,404	$ 45,534,377,845	$ 82,105,943,131
2019	33,527,838,928	4,621,814,392	46,723,661,952	84,873,315,272
2020	37,450,731,186	3,184,248,746	49,174,094,142	89,809,074,074
2021	38,402,155,212	3,505,355,079	50,448,715,615	92,356,225,906
2022	40,197,454,923	3,957,962,360	52,519,838,576	96,675,255,859

Valuation results

Funded ratio

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

Funded Ratios

	Funded Ratio (Actuarial Basis)	Funded Ratio (Market Value Basis)
2018	86.4%	82.3%
2019	86.4%	88.9%
2020	86.8%	91.3%
2021	90.0%	95.2%
2022	88.3%	80.1%


BUCK
A Gallagher Company

BUCK
A Gallagher Company

Teachers' and State Employees' Retirement System of North Carolina

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

October 2023

BUCK
A Gallagher Company

110 West Berry Street
Suite 1300
Fort Wayne, IN 46802

October 13, 2023

Board of Trustees
Teachers' and State Employees'
Retirement System of North Carolina
3200 Atlantic Avenue
Raleigh, NC 27604

Members of the Board:

We submit herewith our report on the eightieth annual valuation of the Teachers' and State Employees' Retirement System of North Carolina (referred to as “TSERS” or the “State Plan”) prepared as of December 31, 2022. The report has been prepared in accordance with North Carolina General Statute 135-6(o). Information contained in our report for plan years from December 31, 2017, to December 31, 2020, is based upon 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 TSERS, 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 prepare 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.

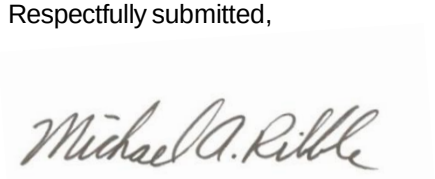
Where presented, references to "funded ratio" and "unfunded accrued liability" typically are measured on an actuarial value of assets basis. It should be noted that the same measurements using market value of assets would result in different funded ratios and unfunded accrued liabilities. Moreover, the 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,



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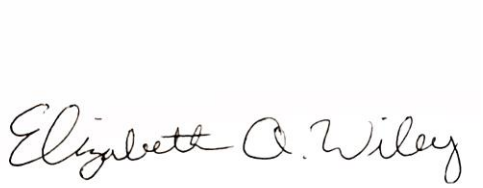

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Executive Summary

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 of the state of North Carolina. During the fiscal year ending June 30, 2023, RSD paid over $7.5 billion in pensions to more than 350,000 retirees and as of June 30, 2023, RSD's defined benefit plan 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 1941, the Teachers' and State Employees' Retirement System (referred to as "TSERS" or the "State Plan") was established. TSERS provides benefits to all full-time teachers and state employees in all public-school systems, universities, departments, institutions, and agencies of the state. With over $77 billion in assets and over 760,000 members as of December 31, 2022, it is the largest pension plan within the NC Retirement Systems. This actuarial valuation report is our annual analysis of the financial health of TSERS. This report, prepared as of December 31, 2022, presents the results of the eightieth annual valuation of TSERS.

Purpose

An actuarial valuation is performed on TSERS annually as of the end of the calendar year. The actuary determines the amount of contributions to be made to TSERS 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 TSERS,
- 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)

Actuary's Comments and Other Observations

Membership

As with any estimate, the actuary collects information that we know now. Under the actuarial valuation process, current information about TSERS 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.

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	297,802	300,310
Members currently receiving Disability Income Plan benefits	4,491	4,961
Terminated vested members and survivors of deceased members entitled to benefits but not yet receiving benefits	62,192	57,664
Terminated non-vested members and survivors of deceased members entitled to a refund of contributions	152,273	140,978
Retired members and survivors of deceased members currently receiving benefits	246,374	238,652
Total	763,132	742,565

The number of active members decreased 0.8% from the previous valuation date. The number of retired members and survivors of deceased members currently receiving benefits increased by 3.2% from the previous valuation date. The increase in retiree population is consistent with expectations.

Reported compensation for active members for the year ending December 31, 2022 was $16.1 billion compared to $15.3 billion in the prior year, an increase of 5.4%. Covered payroll was expected to increase annually by 3.25%. Payroll that is increasing faster than we assume results in more benefits accruing that we anticipate, but also more contributions supporting the system. Although the pay increases will ultimately lead to increases in the dollar amounts of contributions, the immediate effect on the December 31, 2022 actuarial valuation is a reduction in the funded ratio and an increase in required employer contribution rates compared to those anticipated in prior projections.

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 membership data can be found in Section 2 of this report.

Executive Summary (continued)

Assets

TSERS assets are held in trust and are invested for the exclusive benefit of plan members. The Market Value of Assets is $77.4 billion as of December 31, 2022 and was $88.0 billion as of December 31, 2021. The investment return for the market value of assets for calendar year 2022 was (10.38)%.

Market value returns during 2022 were lower than the 6.50% assumed rate of return, resulting in higher required contributions and a lower funded ratio than anticipated in the December 31, 2021 baseline projections presented in the December 31, 2021 actuarial report.

The actuarial value of assets smooths investment gains and losses. The actuarial value of assets is $85.4 billion as of December 31, 2022 and was $83.1 billion 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.

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 $1.6 billion during 2022. The assets at actuarial value were $11.1 billion 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 recent experience study, the 6.50% discount rate used in this valuation is reasonable and appropriate.

A detailed summary of asset information can be found 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 TSERS 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 TSERS due to the legislature contributing at least the actuarially determined employer contribution on the basis of an actuarially sound funding policy, benefit cuts have not been needed in North Carolina as they have been in most other states. However, if North Carolina's investment policy shifts substantively, the system should review likely impacts of the shift and consider corresponding changes to actuarial assumptions, funding policy and/or benefit levels.

As noted previously, cost-of-living increases are periodically considered by the Board of Trustees to the extent that certain financial conditions are met. Specifically, benefit allowance increases are generally considered when the trust experiences sufficient investment gains to cover the additional actuarial accrued liabilities created by the cost-of-living adjustment. In addition to employers consistently contributing the actuary's recommended contribution, this benefit increase policy has helped keep costs manageable when compared to other Public Sector Retirement Systems in the United States. That being said, post-retirement increases help to reduce the risk that the benefit will be eroded by inflation.

A detailed summary of the benefit provisions can be found in Appendix B of this report.

Executive Summary (continued)

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 TSERS 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 TSERS 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 actuarial assumptions can be found in Appendix C of this report.

Funding Methodology

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

A detailed summary of actuarial methods can be found in Appendix C of this report. A summary of the Employer Contribution Rate Stabilization Policy (ECRSP) can be found in Appendix F.

Liabilities

The Actuarial Accrued Liability (AAL) increased from $92.4 billion to $96.7 billion during 2022. The Retirement System 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 the next as more benefits accrue and the membership approaches retirement. The AAL was $1.8 billion higher than expected, resulting primarily from higher-than-expected salary increases for continuing active members.

A detailed summary of the actuarial accrued liability can be found in Section 4 of this report.

Executive Summary (continued)

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 TSERS actually has in the fund to the amount TSERS 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 90.0% at December 31, 2021 to 88.3% at December 31, 2022.

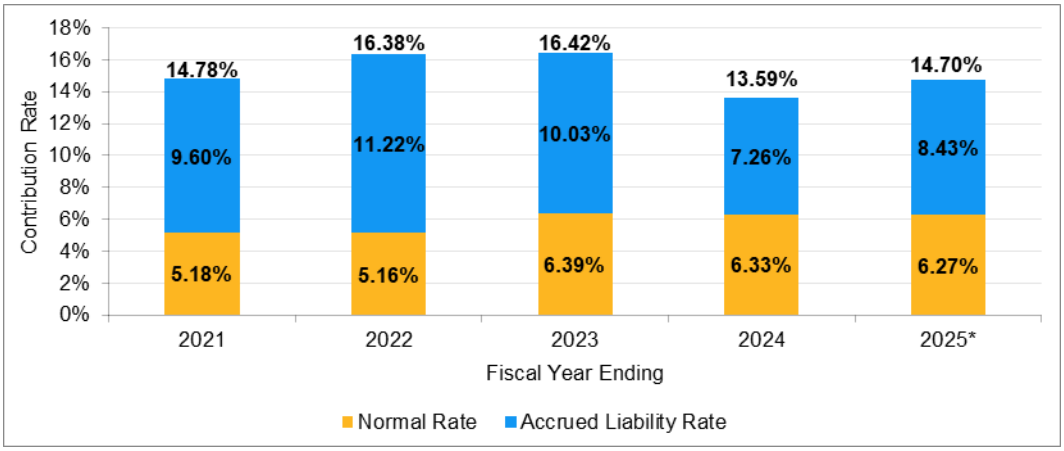
Unfunded Accrued Liability

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 $9.2 billion at December 31, 2021 to $11.3 billion at December 31, 2022. A detailed reconciliation of the UAAL can be found in Section 4 of this report.

Actuarially Determined Employer Contribution Rates Before Applying Funding Policy Minimums

The graph below provides a history of actuarially determined employer contribution rates prior to application of the ECRSP over the past five years.



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

The actuarially determined employer contribution rate prior to application of the ECRSP 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 for most of these Systems much longer. The shorter period results in higher contributions and more benefit security.

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

Projections

Projections of contribution requirements and funded status into the future can be helpful planning tools for stakeholders. The projections of the actuarial valuation are known as deterministic projections. Deterministic projections are based on one scenario in the future. The baseline deterministic projection is based on December 31, 2022 valuation results and assumptions.

A detailed summary of the deterministic projections can be found in Section 6 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. Section 6 of this report demonstrates the sensitivity of future projected results to asset returns deviating from expected returns.
- 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 (10.38)% during calendar year 2022 compared to 6.50% assumed
- Liabilities $1.8 billion higher than anticipated as of December 31, 2022, primarily from higher-than-expected salary increases for continuing active members
- Recent legislation signed into law since the prior valuation
    - One-time supplement payment for TSERS payees of 4% of their annual retirement allowance, payable by November 2023
- 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

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

- A lower funded ratio as of December 31, 2022 (88.3% in the valuation compared to 93.0% in the baseline projection)
- A higher actuarially determined employer contribution rate prior to applying the Employer Contribution Rate Stabilization Policy (ECRSP) for fiscal year ending June 30, 2025 (14.70% in the valuation compared to 11.62% in the baseline projection)

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

- Stakeholders working together to keep TSERS well-funded since inception
- A history of appropriating and contributing a minimum of the recommended contribution requirements
- Implementation of the ECRSP which provides additional funding of the System
- Assumptions that in aggregate are more conservative than peers
- A funding policy that aggressively pays down the unfunded liability over a 12-year period
- An ad hoc cost-of-living adjustment, which typically only provides benefit increases when certain financial conditions are met, that supports the health of the system
- Modest changes in benefits when compared to peers

As has been done over the past 80 years, continued focus on these measures will be needed to maintain the solid status of TSERS 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 eightieth annual 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	297,802	300,310
Reported Compensation	$16,141,902,861	$15,312,224,584
Valuation Compensation*	$17,600,816,901	$16,632,724,779
Retired Members and Survivors of Deceased Members Currently Receiving Benefits		
Number	246,374	238,652
Annual Allowances	$ 5,258,568,393	$ 5,044,817,043
Assets		
Actuarial Value (AVA)	$85,406,884,383	$83,139,458,098
Market Value (MVA)	$77,445,236,928	$87,966,352,518
Actuarial Accrued Liability (AAL)	$96,675,255,859	$92,356,225,906
Unfunded Accrued Liability (AAL-AVA)	$11,268,371,476	$ 9,216,767,808
Funded Ratio (AVA/AAL)**	88.3%	90.0%
Results for Fiscal Year Ending	**6/30/2025**	**6/30/2024**
Actuarially Determined Employer Contribution (ADEC), as a percentage of payroll		
Normal Cost	6.27%	6.33%
Accrued Liability	9.63%	7.85%
Total Preliminary ADEC	15.90%	14.18%
Total Based on Direct Rate Smoothing	14.70%	12.39%
Impact of Benefit Changes***	Not Final	1.20%
ADEC Prior to Application of Funding Policy	Not Final	13.59%
Board of Trustees Recommended Contribution under the Employer Contribution Rate Stabilization Policy (ECRSP)	16.79%	17.64%
Required Employer Contribution NCGS 135-8(d)	16.79%	17.64%
Appropriations Act for Fiscal Year Ending	**6/30/2025**	**6/30/2024**
Employer Contribution Rate as a percentage of payroll		
Normal Cost	6.27%	6.33%
Accrued Liability	N/A	11.31%
Total	N/A	17.64%

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

** The Funded Ratio on a Market Value of Assets basis is 80.1% at December 31, 2022

*** FY 2024 rate reflects the Legislated One-Time Pension Supplement of 1.20%.

Section 2: Membership Data

The Retirement Systems Division provided membership data as of the valuation date for each member of TSERS. 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	297,802	300,310
Members currently receiving Disability Income Plan benefits	4,491	4,961
Terminated vested members and survivors of deceased members entitled to benefits but not yet receiving benefits	62,192	57,664
Terminated non-vested members and survivors of deceased members entitled to a refund of contributions	152,273	140,978
Retired members and survivors of deceased members currently receiving benefits	246,374	238,652
Total	763,132	742,565

Table 3: Active Member Data

	Member Count	Average Age	Average Service	Reported Compensation
Teachers, Librarians and Counselors	151,620	43.96	10.70	$ 7,912,980,326
Other Education	46,255	49.48	11.25	2,295,520,415
General Employees	94,603	47.16	10.92	5,574,480,789
Law Enforcement Officers	5,324	40.08	11.58	358,921,331
Total	297,802	45.76	10.87	$ 16,141,902,861

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

Table 4: Disabled Member Data

(Receiving Benefit from the Disability Income Plan of North Carolina)

	Member Count	Average Age	Average Service	Valuation Compensation
Teachers, Librarians and Counselors	1,514	55.55	14.11	$ 59,296,647
Other Education	643	57.59	13.42	17,916,652
General Employees	2,302	56.39	13.38	84,783,390
Law Enforcement Officers	32	49.52	15.74	1,417,077
Total	4,491	56.23	13.65	$ 163,413,766

The table above includes members not in receipt of benefits who did not have reported compensation in 2022 and who were reported as disabled in the current or prior valuations and not subsequently reported as returned to work.

Section 2: Membership Data (continued)

Table 5: Terminated Vested Member Data

	Member Count	Average Age	Average Service	Annual Deferred Retirement Allowances
Teachers, Librarians and Counselors	29,130	45.83	9.33	$ 223,428,122
Other Education	6,624	50.54	10.17	55,922,383
General Employees	25,727	51.61	9.15	193,884,930
Law Enforcement Officers	711	44.53	9.92	6,536,810
Total	62,192	48.71	9.35	$ 479,772,245

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

Table 6: Terminated Non-Vested Member Data

	Member Count	Average Age	Average Service	Accumulated Contributions
Teachers, Librarians and Counselors	60,959	40.80	1.89	$ 324,947,431
Other Education	17,454	45.20	1.59	59,371,488
General Employees	72,673	45.59	1.61	391,463,835
Law Enforcement Officers	1,187	39.55	2.18	8,488,036
Total	152,273	43.58	1.72	$ 784,270,790

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

Section 2: Membership Data (continued)

Table 7: Data for Members Currently Receiving Benefits

	Member Count	Average Age	Annual Retirement Allowances
Retired Members (Healthy at Retirement)			
Teachers and Other Education	124,447	71.45	$ 2,967,701,499
General Employees	87,560	72.67	1,671,335,654
Law Enforcement Officers	3,646	65.37	119,955,271
Total	215,653	71.84	$ 4,758,992,424
Retired Members (Disabled at Retirement)*			
Teachers and Other Education	4,719	72.17	$ 90,488,084
General Employees	7,867	71.79	125,271,122
Law Enforcement Officers	161	69.40	4,065,672
Total	12,747	71.90	$ 219,824,878
Survivors of Deceased Members			
Teachers and Other Education	6,051	73.54	$ 113,709,000
General Employees	11,379	73.74	153,873,131
Law Enforcement Officers	544	72.96	12,168,960
Total	17,974	73.65	$ 279,751,091
Grand Total	246,374	71.98	$ 5,258,568,393

* 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 TSERS members. The tables below provide the details of the Market Value of Assets for the current and prior years' valuations.

Table 8: Market Value of Assets

Asset Data as of	12/31/2022	12/31/2021
Beginning of Year Market Value of Assets	$ 87,966,352,518	$ 81,969,425,086
Employer Contributions	3,039,949,206	2,403,844,588
Employee Contributions	1,042,052,173	995,528,156
Benefit Payments Other Than Refunds	(5,407,203,621)	(5,123,832,896)
Refunds	(125,034,315)	(111,847,477)
Administrative Expenses	(14,583,835)	(13,985,883)
Investment Income	(9,056,295,198)	7,847,220,944
Net Increase/(Decrease)	(10,521,115,590)	5,996,927,432
End of Year Market Value of Assets	$ 77,445,236,928	$ 87,966,352,518
Estimated Net Investment Return on Market Value	-10.38%	9.68%

Table 9: 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	$ 25,838,232,669	$ 31,544,976,279
Fixed Income (LTIF)	17,896,725,874	21,070,197,448
Cash and Receivables	12,370,186,485	12,611,142,538
Other*	21,340,091,900	22,740,036,253
Total Market Value of Assets	$ 77,445,236,928	$ 87,966,352,518
Allocation by Percentage of Asset Value		
Public Equity	33.4%	35.9%
Fixed Income (LTIF)	23.1%	24.0%
Cash and Receivables	16.0%	14.3%
Other*	27.5%	25.8%
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 TSERS, 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 10: Actuarial Value of Assets

Asset Data as of	12/31/2022
Beginning of Year Actuarial Value of Assets	$ 83,139,458,098
Beginning of Year Market Value of Assets	$ 87,966,352,518
Contributions	4,082,001,379
Benefit Payments	(5,546,821,771)
Net Cash Flow	(1,464,820,392)
Expected Investment Return	5,670,955,694
Expected End of Year Market Value of Assets	$ 92,172,487,820
End of Year Market Value of Assets	$ 77,445,236,928
Excess of Market Value over Expected Market Value of Assets	(14,727,250,892)
80% of 2022 Asset Gain/(Loss)	(11,781,800,714)
60% of 2021 Asset Gain/(Loss)	1,547,037,715
40% of 2020 Asset Gain/(Loss)	1,228,468,748
20% of 2019 Asset Gain/(Loss)	1,044,646,796
Total Deferred Asset Gain/(Loss)	(7,961,647,455)
Preliminary End of Year Actuarial Value of Assets	$ 85,406,884,383
Final End of Year Actuarial Value of Assets (not less than 80% and not greater than 120% of Market Value)	$ 85,406,884,383
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 $1.6 billion during 2022. The assets at actuarial value were $11.3 billion less than the actuarial accrued liability as of December 31, 2022.

Section 3: Asset Data (continued)

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

Table 11: Historical Asset Returns

Calendar Year	Expected Asset Return	Actuarial Value of Asset Return	Market Value of Asset Return	20 Year Average Market Return
1996	7.50%	10.18%	9.39%	NA
1997	7.25%	10.18%	18.16%	NA
1998	7.25%	9.92%	16.66%	NA
1999	7.25%	10.60%	10.15%	NA
2000	7.25%	11.55%	2.50%	NA
2001	7.25%	8.51%	-1.87%	NA
2002	7.25%	5.66%	-5.21%	NA
2003	7.25%	7.98%	18.23%	NA
2004	7.25%	8.56%	10.73%	NA
2005	7.25%	8.26%	6.97%	NA
2006	7.25%	8.94%	11.41%	NA
2007	7.25%	8.87%	8.38%	NA
2008	7.25%	2.89%	-19.50%	NA
2009	7.25%	4.74%	14.84%	NA
2010	7.25%	5.89%	11.47%	NA
2011	7.25%	5.15%	2.19%	NA
2012	7.25%	6.32%	11.82%	NA
2013	7.25%	7.43%	12.21%	NA
2014	7.25%	7.19%	6.21%	NA
2015	7.25%	5.87%	0.36%	6.86%
2016	7.25%	5.32%	6.22%	6.71%
2017	7.20%	6.56%	13.49%	6.49%
2018	7.00%	5.10%	-1.39%	5.60%
2019	7.00%	6.18%	14.85%	5.82%
2020	7.00%	8.80%	11.12%	6.25%
2021	6.50%	9.18%	9.68%	6.84%
2022	6.50%	4.53%	-10.38%	6.54%
20-Yr Average	7.13%	6.67%	6.54%	NA
20-Yr Range	0.75%	6.29%	37.73%	NA

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 past 20 years of 6.67% compares with an average market return of 6.54%. The range of returns on market value of assets is markedly more volatile, 37.73% versus 6.29%. Using the actuarial value of assets instead of market value results in much lower employer contribution volatility, while ensuring that the actuarial needs of TSERS are met.

Section 4: Liability Results

Using the provided membership data, benefit provisions, and actuarial assumptions, the future benefit payments of TSERS 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 year's valuations.

Table 12: Liability Summary

Valuation Results as of	12/31/2022	12/31/2021
(a) Present Value of Future Benefits		
(1) Active Members	$ 56,280,874,310	$ 53,693,838,643
(2) Terminated Members	3,957,962,360	3,505,355,079
(3) Members Currently Receiving Benefits	52,519,838,576	50,448,715,615
(4) Total	$ 112,758,675,246	$ 107,647,909,337
(b) Present Value of Future Normal Costs		
(1) Employee Future Normal Costs	$ 7,974,210,837	$ 7,567,182,471
(2) Employer Future Normal Costs	8,109,208,550	7,724,500,960
(3) Total	$ 16,083,419,387	$ 15,291,683,431
(c) Actuarial Accrued Liability: (a4) - (b3)	$ 96,675,255,859	$ 92,356,225,906
(d) Actuarial Value of Assets	$ 85,406,884,383	$ 83,139,458,098
(e) Unfunded Accrued Liability: (c) - (d)	$ 11,268,371,476	$ 9,216,767,808

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 13: Reconciliation of Unfunded Actuarial Accrued Liability

(in millions)	
Unfunded Actuarial Accrued Liability (UAAL) as of 12/31/2021	$ 9,217
Normal Cost and Administrative Expense during 2022	1,887
Reduction due to Actual Contributions during 2022	(4,082)
Interest on UAAL, Normal Cost, and Contributions	590
Asset (Gain)/Loss	1,625
Actuarial Accrued Liability (Gain)/Loss	1,824
Impact of Assumption Changes	-
Impact of Benefit Changes	207
Unfunded Actuarial Accrued Liability (UAAL) as of 12/31/2022	$ 11,268

Commentary: During 2022, the UAAL increased due to the asset loss of $1,625 million. Additionally, changes in the census data, primarily higher-than-expected salary increases for continuing active members, increased the UAAL by $1,824 million.

Section 5: Actuarially Determined Employer Contribution

The actuarially determined employer contribution consists of a normal cost rate, an accrued liability rate and an administrative expense 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 expense rate is the payment for expected administrative expenses.

The table below provides the calculation of the actuarially determined employer contribution for the current and prior years' valuations.

The Employer Contribution Rate Stabilization Policy (ECRSP) adopted by the Board of Trustees on April 29, 2021 requires that recommended contributions be 0.35% of payroll greater than the appropriated contribution during the prior year, with the following bounds: (1) contributions may not be less than the actuarially determined employer contribution (ADEC) calculated below and (2) contributions may not be greater than a contribution determined using the same assumptions used to calculate the ADEC but using a discount rate equal to the long-term Treasury bond yield.

The ECRSP would result in a recommended contribution rate of 16.79% of payroll for fiscal year ending 2025 before recognizing any benefit improvements that may be enacted.

- The minimum (before considering the ADEC) is 16.79%; Board's recommended appropriation for the fiscal year ending 2024 of 16.44%, plus 0.35%.
- 15.90% is the actuarially determined employer contribution calculated in this most recent valuation prior to direct rate smoothing and before applying the ECRSP. 14.70% is the actuarially determined employer contribution after direct rate smoothing of the assumption and method changes and before applying the ECRSP.
- The maximum is approximately 53.56%; the estimated actuarially determined employer contribution using a discount rate equal to the long-term Treasury bond yield (3.97%).

Table 14: Calculation of the Actuarially Determined Employer Contribution (ADEC) Prior to ECRSP

Valuation Date	12/31/2022	12/31/2021
ADEC for Fiscal Year Ending	6/30/2025	6/30/2024
Normal Cost Rate Calculation		
(a) Normal Cost Rate	6.17%	6.23%
(b) Expense Rate	0.10%	0.10%
(c) Total Normal Cost Rate	6.27%	6.33%
Accrued Liability Rate Calculation		
(d) Total Annual Amortization Payments*	$ 1,747,345,937	$ 1,346,262,327
(e) Projected Compensation**	18,152,305,049	17,158,811,726
(f) Accrued Liability Rate: (d) / (e)	9.63%	7.85%
Total ADEC (c) + (f)	15.90%	14.18%
ADEC with Direct Rate Smoothng	14.70%	12.39%
Impact of Benefit Changes***	Not Final	1.20%
Final ADEC Prior to ECRSP	Not Final	13.59%

* See Table 17 for more detail

** Beginning with the December 31, 2017 valuation, compensation is projected to the fiscal year over which contributions will occur

*** FY 2024 rate reflects the Legislated One-Time Pension Supplement of 1.20%.

Section 5: Actuarially Determined Employer Contribution (continued)

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

Table 15: Reconciliation of the Change in the ADEC Prior to ECRSP

Fiscal year ending June 30, 2024 Preliminary ADEC (based on December 31, 2021 valuation)	12.39%
Impact of Benefit Changes*	1.20%
Fiscal year ending June 30, 2024 ADEC Prior to ECRSP	13.59%
Change Due to Anticipated Reduction in UAAL	(0.20%)
Change Due to Demographic (Gain)/Loss	1.05%
Change Due to Investment (Gain)/Loss	1.21%
Change Due to Contributions Greater than ADEC	(0.49%)
Impact of Assumption Changes	0.00%
Impact of Benefit Changes	0.15%
Impact of Direct Rate Smoothing	0.59%
Reversal of one-time Benefit Costs	(1.20%)
Fiscal year ending June 30, 2025 Preliminary ADEC (based on December 31, 2022 valuation)	14.70%

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

Section 5: Actuarially Determined Employer Contribution (continued)

Amortization methods determine the payment schedule for the unfunded actuarial accrued liability. TSERS 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 16: Calculation of the New Amortization Base

Calculation as of		12/31/2022	12/31/2021
(a)	Unfunded Actuarial Accrued Liability	$ 11,268,371,476	$ 9,216,767,808
(b)	Prior Years' Outstanding Balances	$ 7,945,259,358	$ 10,924,236,174
(c)	New Amortization Base: (a) - (b)	$ 3,323,112,118	$ (1,707,468,366)
(d)	New Amortization Payment	$ 433,778,097	$ (222,882,152)

Table 17: Amortization Schedule for Unfunded Accrued Liability

Date Established	Original Balance	12/31/2022 Outstanding Balance	Annual Payment Effective July 1, 2024
December 31, 2009	$ 2,360,173,025	$ 157,064,826	$ -
December 31, 2010	242,581,914	46,790,819	-
December 31, 2011	911,037,989	283,099,837	122,405,196
December 31, 2012	78,277,759	32,930,823	10,485,336
December 31, 2013	(114,027,863)	(59,666,473)	(15,228,907)
December 31, 2014	(206,952,282)	(128,093,467)	(27,559,708)
December 31, 2015	2,586,581,023	1,831,604,642	343,435,477
December 31, 2016	1,983,860,720	1,568,604,612	262,453,830
December 31, 2017	2,551,629,668	2,213,277,986	336,317,586
December 31, 2018	1,836,431,391	1,727,148,913	241,617,831
December 31, 2019	865,931,898	872,283,823	113,563,961
December 31, 2020	1,141,156,638	1,218,666,827	148,959,390
December 31, 2021	(1,707,468,366)	(1,818,453,810)	(222,882,152)
December 31, 2022	3,323,112,118	3,323,112,118	433,778,097
Total		$ 11,268,371,476	$ 1,747,345,937

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

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 18: History of Actuarially Determined Employer Contributions and Appropriated Rates

Valuation Date	Fiscal Year Ending	Normal Rate	Accrued Liability Rate	Effect of Direct Rate Smoothing	Legislated Benefit Cost*	ULSR Contribution G.S. 143C-4-10(e)	ADEC Prior to Applicable Funding Policy	ADEC under ECRSP	Appropriated Rate
12/31/2022	6/30/2025	6.27%	9.63%	(1.20%)	N/A	N/A	N/A	N/A	N/A
12/31/2021	6/30/2024	6.33%	7.85%	(1.79%)	1.20%	0.00%	13.59%	17.64%	17.64%
12/31/2020	6/30/2023	6.39%	11.13%	(2.39%)	1.24%	0.05%	16.42%	17.38%	17.38%
12/31/2019	6/30/2022	5.16%	10.58%	0.00%	0.64%	0.00%	16.38%	16.38%	16.38%
12/31/2018	6/30/2021	5.18%	10.19%	(0.59%)	0.00%	0.00%	14.78%	14.78%	14.78%
12/31/2017	6/30/2020	5.17%	8.99%	(1.19%)	0.00%	0.00%	12.97%	12.97%	12.97%

* 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 one-time supplement equal to 2% of the annual retirement allowance payable in December 2021.

Section 5: Actuarially Determined Employer Contribution (continued)

The following table shows estimates of the potential cost of three 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. The third benefit improvement is a one-time supplement payment for retirees during the upcoming year ending December 31, 2023.

Table 19: Cost of Benefit Enhancements

Calculation as of	12/31/2022	12/31/2021
Increase in UAAL for a 1% COLA	$ 560,833,000	$ 533,364,000
Increase in ADEC for a 1% COLA	0.41%	0.41%
Increase in UAAL for a 1% Supplement	$ 56,604,000	$ 51,188,000
Increase in ADEC for a 1% Supplement	0.31%	0.30%
Increase in UAAL for a 0.01% Increase in the Defined Benefit Formula	$ 534,634,000	$ 508,993,000
Increase in ADEC for a 0.01% Increase in the Defined Benefit Formula	0.46%	0.46%

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 be 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.

The 0.01% increase in the defined benefit formula would include a corresponding increase in retirement allowances. We are assuming that the cost of the 0.01% benefit increase is amortized over a 12-year period.

Section 6: Projections

Projections of contribution requirements and funded status into the future can be helpful planning tools for stakeholders. This section provides such projections. The projections of the actuarial valuation are known as deterministic projections. Deterministic projections are based on one scenario in the future. The baseline deterministic projection is based on December 31, 2022 valuation results as assumptions.

Key Projection Assumptions

- Valuation interest rate of 6.50%
- Direct-rate smoothing of the change in the employer contribution rate due to the changes in assumption and methods over a 5-year period beginning July 1, 2022.
- 6.50% investment return on market value of assets
- Actuarial assumptions and methods as described in Appendix C. All future demographic experience is assumed to be exactly realized.
- The contribution rate under the Employer Contribution Rate Stabilization Policy (ECRSP) is contributed until fiscal year ending 2027.
- The actuarially determined contribution rate is contributed for fiscal years ending 2028 and beyond.
- The employer contribution shall not be less than the employee contribution, which is currently 6%.
- 0% increase in the total active member population
- No cost-of-living adjustments granted
- Future pay increases based on long-term salary increase assumptions

The ECRSP contribution rate is the Stable Contribution rate shown in the projections. See Appendix F for more detail on the ECRSP. In addition, we have provided two alternate deterministic projections. The first alternate deterministic projection is based on the same assumptions as the baseline deterministic projection except that it assumes a 0.0% asset return for calendar year 2023. The second alternate deterministic projection is based on the same assumptions as the baseline deterministic projection except that it assumes a 13.0% asset return for calendar year 2023.

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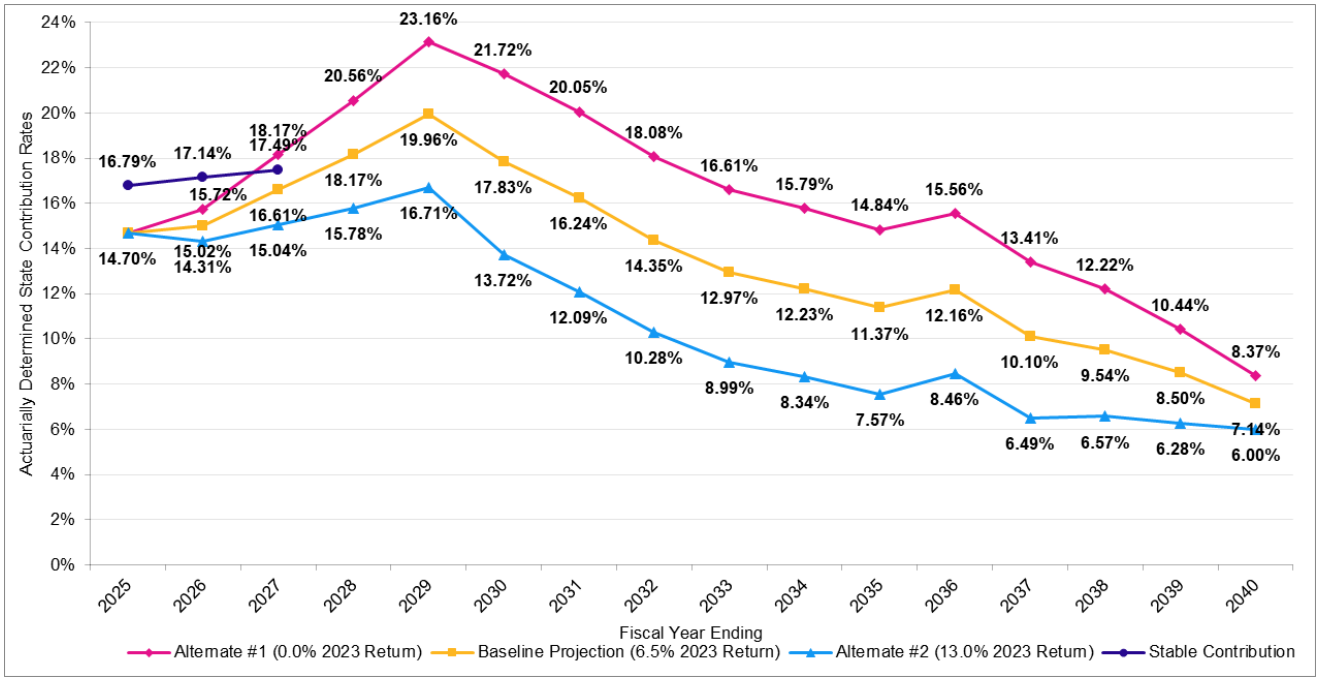
Section 6: Projections (continued)

The graph below provides the actuarially determined employer contribution rates projected for 15 years, as well as the board approved stable contribution under the Employer Contribution Rate Stabilization Policy.

Projected Actuarially Determined Employer Contribution Rates

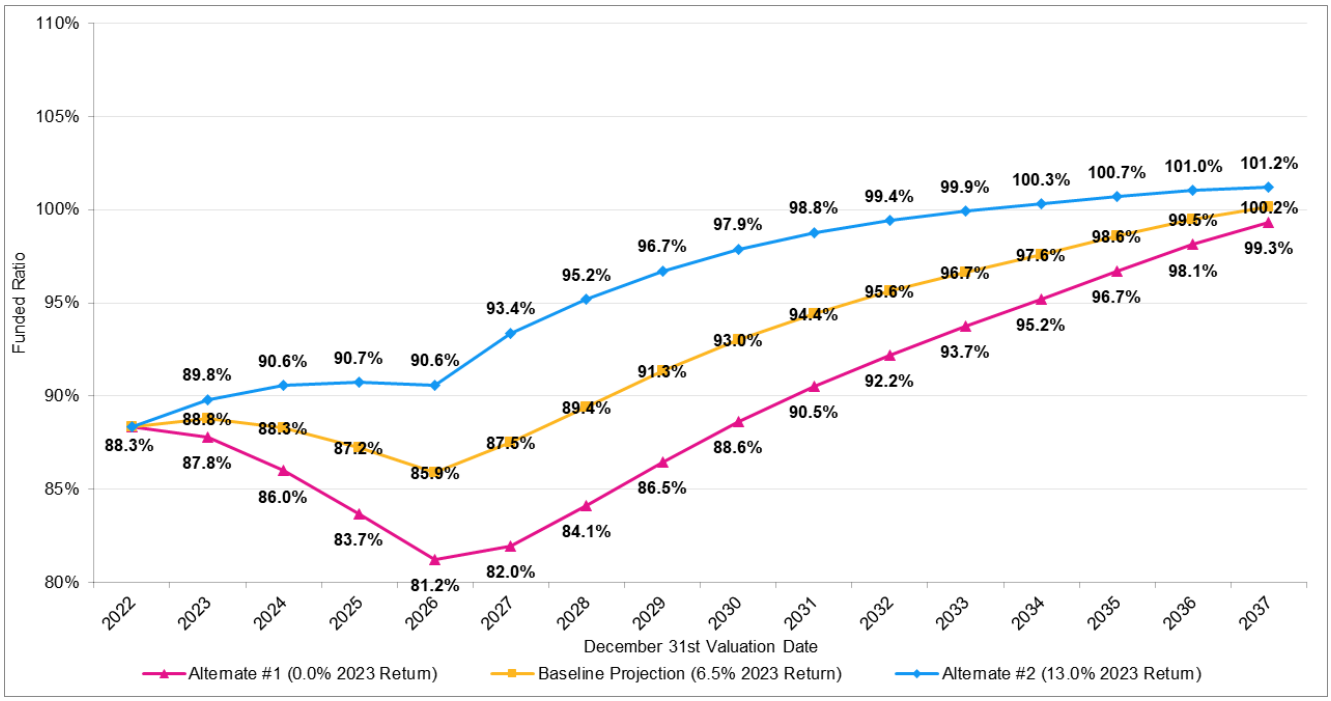


The minimum employer contribution rate is equal to the employee contribution rate of 6.00%.

Section 6: Projections (continued)

The graph below provides the funded ratio projected for 15 years.

Projected Funded Ratio



Absent favorable asset returns and other deviations from expectations resulting in gains to the plan's funded status, funded ratios are expected to decline until 2026, which is the point that the unfavorable asset returns in 2022 are fully recognized in the actuarial value of assets. Subsequently, funded ratios are expected to increase as unfunded liability bases associated with the asset returns in 2022 are amortized.

Appendix A: Detailed Tabulations of Member Data

Table A-1: 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	5,619	5,040	38	0	0	0	0	0	0	0	10,697
	17,588	41,048	40,845	0	0	0	0	0	0	0	28,724
25 to 29	4,992	14,022	4,314	11	0	0	0	0	0	0	23,339
	18,612	44,567	49,880	45,712	0	0	0	0	0	0	39,998
30 to 34	3,971	10,088	12,403	3,574	15	0	0	0	0	0	30,051
	19,382	45,866	53,362	58,826	48,215	0	0	0	0	0	47,003
35 to 39	3,353	8,534	8,757	9,191	3,881	29	0	0	0	0	33,745
	19,141	47,787	56,256	62,877	65,401	55,720	0	0	0	0	53,281
40 to 44	2,965	7,803	7,786	6,392	10,598	3,340	33	0	0	0	38,917
	19,546	48,749	57,110	63,269	68,110	69,076	65,756	0	0	0	57,613
45 to 49	2,517	7,011	7,361	5,820	7,712	8,940	2,754	11	0	0	42,126
	20,013	49,366	55,536	62,746	65,885	71,011	73,268	71,441	0	0	59,725
50 to 54	2,274	6,628	7,282	6,462	8,237	7,086	7,181	806	4	0	45,960
	20,444	49,179	55,170	60,744	63,429	67,843	74,563	80,552	55,396	0	60,281
55 to 59	1,843	5,498	5,902	5,312	7,263	5,626	4,019	1,451	215	2	37,131
	20,601	50,236	53,510	57,964	58,751	62,620	69,064	79,467	76,440	69,578	57,266
60 to 64	1,037	3,552	4,197	3,799	4,917	3,915	1,952	869	459	70	24,767
	20,068	48,319	53,385	56,903	58,821	61,243	65,658	77,671	82,062	82,438	56,557
65 to 69	411	1,118	1,590	1,319	1,475	910	569	316	170	138	8,016
	17,968	46,602	55,607	61,771	62,394	64,386	68,325	77,522	88,540	80,794	58,580
70 & Up	218	526	521	484	503	313	182	104	81	121	3,053
	18,358	41,869	48,118	54,113	58,334	63,294	63,455	74,983	91,807	100,451	54,168
Total	29,200	69,820	60,151	42,364	44,601	30,159	16,690	3,557	929	331	297,802
	19,105	46,931	54,526	60,960	63,771	66,924	71,632	78,945	82,681	88,260	54,203

Appendix A: Detailed Tabulations of Member Data (continued)

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

	Men		Women	
Age	Number	Compensation	Number	Compensation
15			1	$ 7,674
16			1	4,303
17			1	10,788
18	3	$ 30,994	5	32,667
19	37	428,552	72	754,192
20	111	2,155,445	152	2,442,634
21	182	4,052,387	335	6,044,651
22	315	8,436,889	914	19,346,528
23	659	18,316,913	2,140	53,112,786
24	980	32,800,816	2,782	89,582,532
25	1,099	39,885,355	2,957	103,920,229
26	1,180	46,673,055	3,158	116,106,759
27	1,283	52,498,950	3,234	124,156,637
28	1,434	62,305,856	3,394	136,069,489
29	1,515	66,379,740	3,514	144,323,842
30	1,579	72,067,126	3,690	156,222,600
31	1,669	78,104,985	4,053	178,205,129
32	1,766	88,185,018	4,217	190,025,806
33	1,823	92,727,957	4,314	202,077,830
34	1,895	99,017,126	4,507	212,522,637
35	1,857	98,413,734	4,447	214,706,772
36	1,849	102,954,963	4,623	229,415,950
37	1,919	113,049,439	4,730	239,936,596
38	2,044	118,606,281	4,853	253,961,539
39	2,071	122,839,196	4,961	260,986,646
40	2,188	133,498,111	5,220	281,969,837
41	2,176	133,026,962	5,484	299,908,468
42	2,162	134,475,009	5,509	304,357,958
43	2,317	146,733,597	5,628	313,136,205
44	2,213	144,838,600	5,657	319,081,558
45	2,347	152,312,240	5,775	328,396,166
46	2,308	153,277,103	5,996	339,419,990
47	2,308	152,869,318	5,712	324,669,567
48	2,450	161,464,444	6,113	348,922,315
49	2,524	168,055,723	6,160	354,016,540
50	2,579	173,491,605	6,360	364,642,493
51	2,735	183,410,189	6,641	386,526,174
52	2,956	195,248,957	7,042	405,731,649
53	2,667	183,825,370	6,702	384,273,535
54	2,535	172,983,908	6,146	349,951,810

Appendix A: Detailed Tabulations of Member Data (continued)

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

	Men		Women	
Age	Number	Compensation	Number	Compensation
55	2,392	161,125,323	5,687	312,614,061
56	2,229	148,777,686	5,551	303,483,968
57	2,260	146,354,435	5,167	280,796,168
58	2,232	142,090,940	4,974	266,795,245
59	2,164	137,094,830	4,997	269,827,751
60	2,117	133,470,011	4,728	249,490,626
61	1,902	116,906,700	4,278	224,248,769
62	1,757	110,416,142	3,687	197,475,643
63	1,400	88,220,011	2,943	160,226,930
64	1,241	80,353,030	2,481	135,487,389
65	1,121	72,797,196	2,019	110,308,660
66	862	59,674,224	1,401	75,974,605
67	617	39,256,396	999	53,797,069
68	511	33,866,497	675	34,854,158
69	412	27,553,837	597	31,903,228
70	337	20,454,597	466	23,696,457
71	271	17,119,833	330	18,187,177
72	226	12,315,449	295	14,974,339
73	172	9,891,875	205	9,027,443
74	148	8,846,284	145	6,471,615
75	124	7,611,063	111	5,506,417
76	95	5,947,094	89	4,158,818
77	60	3,902,077	61	2,797,463
78	49	2,959,506	41	2,102,255
79	39	2,339,356	37	1,544,126
80	31	1,824,435	29	1,074,522
81	20	1,070,390	12	603,955
82	10	526,764	11	337,898
83	12	784,445	8	423,062
84	3	270,954	6	278,067
85	4	94,930	1	35,732
86	3	126,429	2	126,313
87	3	200,832	1	35,102
89	3	114,700	2	103,218
90	1	67,488	1	32,544
91	1	195,633	1	57,282
Total	88,564	$ 5,304,063,305	209,238	$ 10,837,839,556

Appendix A: Detailed Tabulations of Member Data (continued)

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

	Men		Women	
Service	Number	Compensation	Number	Compensation
0	4,927	$ 69,945,565	14,507	$ 201,897,974
1	7,601	301,584,334	19,576	706,364,622
2	4,739	239,767,642	11,185	506,806,537
3	4,409	236,523,044	11,056	509,192,440
4	4,890	270,312,511	10,796	510,775,313
5	4,417	250,651,447	9,732	479,023,966
6	4,139	242,722,295	9,225	465,170,900
7	3,954	237,219,997	8,251	427,244,916
8	3,585	218,635,358	7,850	420,242,273
9	3,287	203,252,595	7,263	396,890,114
10	3,237	198,616,194	7,276	405,141,512
11	2,860	187,161,681	6,115	353,624,314
12	2,559	169,276,033	5,485	326,222,542
13	2,258	150,437,613	4,721	282,845,822
14	1,889	132,521,221	4,418	263,734,221
15	2,957	196,715,360	6,805	407,985,928
16	2,656	186,293,844	6,643	404,982,724
17	2,694	188,333,726	6,762	413,059,325
18	2,488	172,758,400	6,222	382,304,144
19	2,271	158,962,729	5,690	354,112,334
20	2,030	144,757,242	4,908	310,058,844
21	1,708	125,156,994	4,404	280,415,907
22	1,797	131,501,091	4,632	294,488,688
23	1,706	127,728,475	4,422	281,514,678
24	1,672	128,554,848	4,147	265,647,898
25	1,495	113,031,478	3,615	236,921,259
26	1,289	100,106,203	3,034	204,198,903
27	1,246	100,590,329	2,631	180,025,402
28	946	74,093,718	2,172	151,237,621
29	857	68,221,355	1,772	124,273,365
30	505	43,359,675	1,168	83,858,635
31	350	29,972,751	672	50,949,011
32	235	21,285,454	429	31,579,991
33	229	21,042,441	389	28,912,376
34	141	12,250,418	299	21,360,274
35	137	11,601,200	252	18,525,466
36	93	8,133,527	175	13,919,060
37	69	6,377,163	115	9,278,122
38	49	4,263,870	95	7,494,932
39	48	4,815,534	82	6,414,613

Appendix A: Detailed Tabulations of Member Data (continued)

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

	Men		Women	
Service	Number	Compensation	Number	Compensation
40	34	$ 3,847,001	51	$ 3,674,688
41	18	2,020,008	38	3,716,377
42	23	2,065,105	28	1,964,137
43	8	1,381,515	18	1,116,170
44	19	2,095,777	29	2,226,311
45	9	852,154	23	1,667,770
46	4	293,166	18	1,515,757
47	4	348,285	6	558,985
48	5	395,391	7	708,559
49	6	489,342	8	581,007
50	4	437,152	4	281,954
51	4	386,395	3	218,910
52			4	294,737
53	3	302,622	6	377,324
54	2	353,922		
55	1	151,777	2	121,717
60			1	39,932
62	1	108,338		
67			1	78,255
Total	88,564	$ 5,304,063,305	209,238	$ 10,837,839,556

Appendix A: Detailed Tabulations of Member Data (continued)

Table A-4: Number and Valuation Compensation of Disabled Members Distributed by Age as of December 31, 2022

	Men		Women	
Age	Number	Compensation	Number	Compensation
27	2	$ 43,175		
28			1	$ 17,649
30	1	32,044	2	43,683
31			1	42,720
32	2	17,276	2	24,742
33	3	107,573	4	54,065
34	2	40,613	4	98,334
35	3	52,502	8	285,991
36	2	38,106	7	212,292
37	4	107,106	4	191,072
38	5	187,708	14	371,556
39	4	121,129	9	334,501
40	8	281,500	21	767,487
41	5	143,511	21	831,150
42	6	157,592	16	674,740
43	8	288,998	22	665,406
44	11	395,494	35	1,319,736
45	13	521,078	44	1,664,644
46	22	889,125	50	1,903,611
47	20	842,399	68	2,494,342
48	31	1,368,818	72	2,456,951
49	37	1,404,543	64	2,398,665
50	40	1,621,370	94	3,439,824
51	36	1,359,138	116	4,332,983
52	41	1,750,372	137	4,885,635
53	49	1,820,397	143	5,051,390
54	49	1,969,772	134	5,951,127
55	64	2,399,515	162	5,887,419
56	65	2,368,608	184	6,651,349
57	73	2,952,688	196	7,095,321
58	92	3,429,771	225	8,301,552
59	86	4,033,403	237	8,031,787
60	94	3,330,007	224	7,868,237
61	78	2,922,643	191	6,312,590
62	91	3,311,333	217	7,231,694
63	83	3,143,977	189	6,385,874
64	89	3,209,341	169	6,064,577
65	54	2,099,837	109	3,917,072
66	2	42,118	1	15,112
68	1	8,638	1	27,390

Appendix A: Detailed Tabulations of Member Data (continued)

Table A-4: Number and Valuation Compensation of Disabled Members Distributed by Age as of December 31, 2022 (continued)

	Men		Women	
Age	Number	Compensation	Number	Compensation
69	2	$ 32,808		
70	3	50,299		
71			4	50,100
72	2	31,078	1	21,893
73	1	$ 8,638		
74	1	$ 26,617		
75	2	$ 33,252	1	41,593
Total	1,287	$ 48,995,910	3,204	$ 114,417,856

Appendix A: Detailed Tabulations of Member Data (continued)

Table A-5: Number and Deferred Annual Retirement Allowances of Terminated Vested Members Distributed by Age as of December 31, 2022

	Men		Women	
Age	Number	Allowances	Number	Allowances
24	1	$ 2,626		
25			1	$ 3,036
26	6	19,313	3	10,140
27	15	66,832	25	107,306
28	38	175,108	107	454,328
29	57	280,705	284	1,398,324
30	120	613,751	403	2,031,197
31	139	738,424	552	2,820,830
32	180	1,027,510	743	4,148,957
33	250	1,416,852	850	4,857,282
34	290	1,798,764	858	5,076,365
35	281	1,773,210	990	6,025,756
36	343	2,310,571	1,014	6,410,622
37	382	2,650,598	1,133	7,179,034
38	453	3,113,797	1,192	7,927,484
39	457	3,456,349	1,337	8,920,472
40	489	3,684,186	1,418	9,896,845
41	538	4,282,098	1,514	10,735,852
42	562	4,762,929	1,464	10,975,547
43	522	4,404,868	1,511	11,158,621
44	535	4,731,769	1,488	11,829,379
45	546	4,838,335	1,437	11,493,380
46	568	5,545,634	1,406	11,821,395
47	575	5,586,821	1,365	11,387,292
48	614	6,157,617	1,452	12,423,522
49	577	5,696,685	1,393	11,888,615
50	597	6,098,205	1,401	11,828,924
51	627	6,102,762	1,429	11,841,594
52	651	6,154,380	1,586	12,696,493
53	651	6,143,477	1,592	12,876,712
54	581	5,672,394	1,538	12,525,816
55	523	4,885,501	1,433	11,069,502
56	551	5,039,377	1,357	10,328,501
57	510	4,843,560	1,308	10,177,106
58	563	5,279,650	1,413	10,802,593
59	538	5,006,916	1,384	10,885,985
60	517	4,779,012	1,292	10,093,966
61	366	2,953,293	1,100	7,966,930
62	348	3,006,728	940	6,612,569
63	311	2,771,575	786	5,310,423
64	280	2,173,177	695	4,647,352
65	206	1,665,144	525	3,634,554
66	143	1,097,354	363	2,321,095
67	119	911,614	240	1,360,044

Appendix A: Detailed Tabulations of Member Data (continued)

Table A-5: Number and Deferred Annual Retirement Allowances of Terminated Vested Members Distributed by Age as of December 31, 2022 (continued)

	Men		Women	
Age	Number	Allowances	Number	Allowances
68	76	$ 505,219	228	$ 1,286,039
69	63	430,895	191	1,149,229
70	55	389,851	132	763,530
71	47	409,893	88	530,402
72	32	271,434	79	586,735
73	19	120,753	48	181,024
74	11	44,688	16	180,916
75	11	111,770	24	117,498
76	16	177,007	14	69,050
77	15	93,942	10	58,734
78	8	60,034	8	45,616
79	7	58,188	1	7,656
80	4	35,363	3	7,276
81	2	217,233	7	24,559
82	2	5,892	6	7,929
83	3	7,468	2	5,045
84	4	36,016	3	2,513
85	3	18,848	3	6,065
86	1	1,157	2	22,340
88	2	2,209	1	2,628
89	1	35,566		
93	1	352		
96	1	2,472		
Total	17,004	$ 146,755,721	45,188	$ 333,016,524

Appendix A: Detailed Tabulations of Member Data (continued)

Table A-6: Number and Accumulated Contributions of Terminated Non-Vested Members Distributed by Age as of December 31, 2022

	Men		Women	
Age	Number	Contributions	Number	Contributions
15			2	$ 639
18			2	43
19	5	4,173	16	8,737
20	28	20,726	36	27,174
21	58	78,038	105	95,861
22	141	205,049	217	256,560
23	237	444,902	432	622,610
24	388	784,160	821	1,651,801
25	527	1,294,562	1,283	3,440,938
26	725	2,157,115	1,658	5,375,667
27	873	3,025,454	2,055	7,871,054
28	1,014	3,699,446	2,460	9,983,186
29	1,182	4,395,533	2,620	11,613,225
30	1,306	4,823,208	2,796	13,282,644
31	1,346	5,513,100	2,980	13,730,932
32	1,458	6,144,589	3,265	15,648,832
33	1,501	6,539,996	3,349	16,480,476
34	1,439	6,579,478	3,290	16,457,856
35	1,459	6,797,628	3,306	16,590,364
36	1,464	6,915,445	3,143	16,322,107
37	1,402	6,492,155	3,252	17,595,698
38	1,460	6,974,142	3,365	17,631,256
39	1,286	6,399,554	3,375	18,373,929
40	1,463	7,219,717	3,327	17,760,672
41	1,361	6,773,459	3,339	18,302,395
42	1,320	6,982,379	3,270	18,523,862
43	1,327	6,704,557	3,257	18,373,995
44	1,236	6,333,571	3,025	17,305,777
45	1,196	6,734,314	2,955	17,482,962
46	1,199	7,011,462	2,792	15,907,495
47	1,061	5,904,474	2,581	14,823,257
48	1,068	5,827,176	2,716	15,166,260
49	1,092	6,264,131	2,397	13,798,183
50	1,110	6,568,988	2,392	13,642,730
51	1,110	6,112,984	2,414	14,089,410
52	1,199	7,027,352	2,566	14,770,311
53	1,048	6,198,266	2,452	14,046,199
54	973	5,857,726	2,092	11,964,368
55	965	5,774,495	1,936	11,005,476
56	883	5,031,808	1,802	9,808,238
57	880	5,053,606	1,738	9,721,224
58	801	4,589,915	1,777	9,685,337
59	782	4,726,114	1,664	9,148,461
60	693	3,852,769	1,499	8,477,121

Appendix A: Detailed Tabulations of Member Data (continued)

Table A-6: Number and Accumulated Contributions of Terminated Non-Vested Members Distributed by Age as of December 31, 2022 (continued)

	Men		Women	
Age	Number	Contributions	Number	Contributions
61	591	$ 3,001,361	1,302	$ 7,192,181
62	638	3,579,335	1,214	6,679,831
63	517	3,223,790	1,052	6,056,252
64	493	2,925,748	925	5,376,693
65	486	2,564,921	843	4,678,491
66	369	2,140,457	662	4,528,410
67	349	2,323,304	566	3,077,874
68	344	2,054,831	569	2,913,621
69	304	1,826,052	473	2,633,283
70	241	1,192,003	421	2,588,641
71	198	1,063,902	315	1,968,228
72	170	928,626	279	1,641,572
73	111	976,392	220	1,093,150
74	77	537,832	102	490,831
75	54	220,068	59	241,947
76	42	269,678	62	240,828
77	22	97,065	38	185,050
78	28	163,418	22	58,286
79	23	71,183	16	105,554
80	12	70,799	15	94,155
81	14	35,020	11	41,744
82	9	30,162	7	64,323
83	10	29,602	8	12,190
84	12	59,640	5	1,579
85	3	23,543	8	37,206
86	5	34,124	5	17,044
87	3	6,614	3	21,754
88	8	16,048	4	5,704
89	4	3,352	4	547
90	4	24,763	1	252
91	2	933	2	158
92	1	5,242	4	1,856
93	1	209		
94	2	6,395	1	387
95	1			
96			2	6,055
97	2	53	2	234
98			2	54
99	1	2,078	3	32
100			1	87
101			3	916
102	1	149	1	345
103			1	250
104			1	57
105	1	1,393	1	14
Total	47,219	$ 235,347,801	105,054	$ 548,922,988

Appendix A: Detailed Tabulations of Member Data (continued)

Table A-7: 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
<20	5	$ 22,209	4	$ 32,444
20	6	63,902	2	28,561
21				
22			4	64,689
23	1	7,712	1	8,875
24	7	41,875	2	16,779
25	5	85,609	6	43,345
26	7	33,788	4	34,738
27	6	77,878	7	102,054
28	3	33,093	6	66,432
29	6	69,343	5	74,678
30	3	28,981	14	188,987
31	10	149,478	11	97,091
32	9	102,588	10	112,470
33	12	144,020	16	152,447
34	19	133,324	13	133,462
35	13	206,010	17	194,139
36	14	125,117	23	841,873
37	12	115,796	20	198,485
38	13	163,489	16	192,298
39	20	185,831	17	136,506
40	19	240,920	27	316,840
41	29	271,179	31	386,934
42	27	408,275	32	280,229
43	18	235,809	28	310,847
44	24	218,222	29	411,486
45	21	237,927	36	429,900
46	28	384,055	41	446,913
47	27	355,715	47	643,050
48	45	843,666	45	560,234
49	52	1,105,620	44	633,122
50	106	2,837,582	120	2,396,165
51	271	8,144,745	316	7,059,409
52	357	11,278,735	557	14,473,935
53	457	15,221,425	756	22,052,411
54	519	17,136,087	998	29,485,058
55	622	20,570,622	1,075	31,561,227
56	745	24,165,534	1,257	36,584,424
57	788	25,562,895	1,363	39,854,648
58	858	27,732,612	1,645	47,721,423
59	1,007	31,905,863	1,857	53,082,978
60	1,208	37,637,415	2,254	62,527,206
61	1,429	42,343,985	3,131	80,584,189
62	1,609	44,158,848	3,799	89,205,723
63	1,849	45,351,288	4,574	96,767,747

Appendix A: Detailed Tabulations of Member Data (continued)

Table A-7: 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
64	2,115	$ 49,971,714	5,040	$ 101,479,939
65	2,258	52,980,795	5,844	121,958,902
66	2,601	58,054,164	6,752	138,571,362
67	2,817	62,476,292	7,080	145,529,253
68	3,031	67,772,508	7,439	151,185,555
69	3,079	68,196,021	7,876	160,384,376
70	3,184	72,756,909	8,059	166,346,559
71	3,307	75,203,169	7,977	164,715,457
72	3,287	74,018,619	7,612	156,893,304
73	3,156	72,473,463	7,327	146,775,626
74	3,213	73,923,933	7,184	141,648,152
75	3,222	74,268,711	7,015	136,201,875
76	3,389	80,203,603	7,394	143,782,498
77	2,316	53,624,564	5,011	95,067,029
78	2,264	52,345,834	4,623	86,177,299
79	1,985	46,409,984	4,549	85,030,626
80	1,994	49,234,565	4,447	82,825,039
81	1,574	37,527,307	3,602	65,200,626
82	1,390	33,315,608	3,176	57,457,972
83	1,227	30,030,132	2,877	51,721,936
84	1,139	27,902,714	2,564	45,559,844
85	983	23,771,367	2,383	40,911,884
86	794	20,315,830	2,006	35,256,604
87	766	19,314,478	1,878	32,684,847
88	614	15,713,029	1,788	30,283,491
89	535	13,589,100	1,371	22,383,261
90	432	10,531,636	1,230	20,326,096
91	377	9,090,127	1,088	18,342,050
92	281	7,536,507	867	14,926,361
93	245	6,279,926	730	12,359,250
94	169	4,358,113	593	9,725,015
95	114	2,611,384	450	7,609,143
96	86	2,167,991	324	4,966,998
97	72	1,650,631	272	4,117,697
98	36	703,969	172	2,605,775
99	26	482,847	137	2,094,230
100+	43	1,077,181	223	3,117,342
Total	70,407	$ 1,712,023,792	163,220	$ 3,326,719,724

Appendix A: Detailed Tabulations of Member Data (continued)

Table A-8: 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	23,831	$ 561,258,580	88,489	$ 1,777,549,518
Option 1	326	10,067,660	1,304	24,067,148
Option 2	13,879	337,746,449	10,237	178,034,355
Option 3	3,474	102,982,717	4,252	91,650,320
Option 4	8,726	215,213,033	24,099	537,340,005
Option 5-2	60	1,863,367	32	302,414
Option 5-3	37	1,254,327	37	728,941
Option 6-2	11,160	289,840,092	13,204	285,119,217
Option 6-3	4,113	127,413,377	8,388	216,416,882
Other	4	127,521	1	16,501
Survivors of Deceased Members	4,797	64,256,669	13,177	215,494,423
Total	70,407	$ 1,712,023,792	163,220	$ 3,326,719,724

Appendix A: Detailed Tabulations of Member Data (continued)

Table A-9: 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
50			1	$ 20,366
51	1	$ 18,496	5	100,512
52	5	119,214	3	64,750
53	9	196,858	16	440,839
54	18	390,328	20	433,649
55	22	493,587	26	613,743
56	26	590,213	29	729,710
57	25	491,324	34	806,464
58	37	816,573	49	1,088,707
59	36	839,886	53	1,166,029
60	58	1,268,007	99	2,110,680
61	85	1,677,928	162	3,136,671
62	72	1,439,236	218	4,019,354
63	81	1,650,487	171	3,169,446
64	109	1,976,875	209	3,732,616
65	149	2,711,726	292	5,162,513
66	205	3,339,852	396	6,153,822
67	190	3,150,864	460	7,565,292
68	187	3,107,854	436	7,174,053
69	190	3,305,739	490	8,296,278
70	217	3,726,425	500	8,961,806
71	215	3,883,707	532	9,658,989
72	211	3,701,607	579	10,187,631
73	222	3,736,501	487	8,462,055
74	204	3,560,842	462	8,342,663
75	254	4,710,902	466	8,099,354
76	214	3,966,026	472	8,239,044

Appendix A: Detailed Tabulations of Member Data (continued)

Table A-9: Number and Annual Retirement Allowances of Retired Members (Disabled at Retirement) Distributed by Age as of December 31, 2022 (continued)

	Men		Women	
Age	Number	Allowances	Number	Allowances
77	141	$ 2,482,906	332	$ 5,604,924
78	112	1,965,994	318	5,086,711
79	110	1,836,588	293	4,316,735
80	107	1,917,003	273	4,413,975
81	70	1,241,425	203	3,141,610
82	59	888,635	168	2,248,261
83	70	1,056,446	118	1,745,566
84	36	506,630	136	1,734,299
85	32	558,165	119	1,566,008
86	21	281,931	60	839,753
87	13	235,799	48	644,045
88	8	143,655	23	321,206
89	7	129,476	30	388,219
90	5	176,501	20	226,601
91	13	221,306	15	192,922
92	10	94,372	17	193,411
93	1	10,172	11	158,742
94	2	16,010	10	134,298
95			8	91,767
96			6	95,152
97			6	67,745
98			1	6,606
99			6	35,214
Total	3,859	$ 68,634,071	8,888	$ 151,190,806

Appendix A: Detailed Tabulations of Member Data (continued)

Table A-10: 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	1,887	$ 35,593,552	6,212	$ 108,445,817
Option 1	38	763,830	143	2,183,046
Option 2	824	12,148,331	787	10,865,356
Option 3	177	3,352,613	281	4,417,283
Option 4	135	2,944,890	392	7,160,646
Option 5-2	1	20,506		
Option 5-3				
Option 6-2	597	9,737,076	674	10,651,691
Option 6-3	200	4,073,273	398	7,446,005
Other			1	20,962
Total	3,859	$ 68,634,071	8,888	$ 151,190,806

Appendix A: Detailed Tabulations of Member Data (continued)

Table A 11: Number and Annual Retirement Allowances of Retired Members and Survivors of Deceased Members Distributed by Amount of Annual Retirement Allowance as of December 31, 2022

Amount of Annual Retirement Allowances	Number of Retired Members and Survivors	Sum of Annual Retirement Allowances
$0 -$ 4,999	30,985	$ 94,303,530
$5,000 - $9,999	40,339	300,089,899
$10,000 - $14,999	34,545	430,011,093
$15,000 - $19,999	27,379	476,185,179
$20,000 - $24,999	23,986	540,403,493
$25,000 - $29,999	23,546	646,796,099
$30,000 - $34,999	22,388	725,674,749
$35,000 - $39,999	15,977	596,423,203
$40,000 -$ 44,999	9,823	415,458,998
$45,000 - $49,999	5,914	279,488,955
$50,000 & over	11,492	753,733,194
Total	246,374	$ 5,258,568,393

Appendix B: Summary of Main Benefit and Contribution Provisions

A summary of the main benefit provisions of the Retirement System and of the sources of revenue from which benefits are paid is presented in the following digest. Items in parentheses in the text are the provisions applicable to law enforcement officers.

Average final compensation

The average annual compensation during the four consecutive years of membership service that afford the highest such average

Membership service

Service represented by regular contributions

Creditable service

Membership service, which may also include certain noncontributory or purchased service.

Benefits

Unreduced Retirement Allowance

Condition for Allowance

An unreduced retirement allowance is payable to any member who retires from service:

(a) after age 65 (55) and completion of five years of creditable service.

(b) after age 60 and completion of 25 years of creditable service (not applicable to law enforcement officers); or

(c) after completion of 30 years of creditable service.

Amount of Allowance

1.82% of average final compensation multiplied by the number of years of creditable service.

In no event will a member whose creditable service commenced on or before June 30, 1963 receive a smaller retirement allowance than he would have received under the benefit provisions of the system in effect on that date.

Reduced Retirement Allowance

Condition for Allowance

A reduced retirement allowance is payable to any member who retires from service prior to becoming eligible for an unreduced retirement allowance but after age 60 and completion of five years of membership service (age 55 and five years of creditable service).

Amount of Allowance

The member's reduced retirement allowance is equal to 1.82% of average final compensation multiplied by the number of years of creditable service at date of retirement reduced by 1/4 of 1% for each month by which the member’s age at retirement is less than age 65.

In no event will a member whose creditable service commenced on or before June 30, 1963 receive a smaller retirement allowance than he would have received under the benefit provisions of the system in effect on that date.

OR

Appendix B: Summary of Main Benefit and Contribution Provisions (continued)

Condition for Allowance

A reduced retirement allowance is payable to any member who retires from service after age 50 and completion of 20 (15) years of creditable service but prior to becoming eligible for a reduced or unreduced retirement allowance.

Amount of Allowance

The member's reduced retirement allowance is equal to 1.82% of average final compensation multiplied by the number of years of creditable service at date of retirement reduced by the lesser of:

(i) 5/12 (1/3) of 1% for each month by which his or her age is less than 60 (55), plus, if the member is not a law enforcement officer, 1/4 of 1% for each month by which his or her age is less than 65.

(ii) 5% times the difference between 30 years and his or her creditable service at retirement.

OR

Condition for Allowance

A reduced retirement allowance is payable to any law enforcement officer who retires from service at any age with 25 years of service (15 years as an officer), but prior to becoming eligible for a reduced or unreduced retirement allowance.

Amount of Allowance

The member's reduced retirement allowance is equal to 1.82% of average final compensation multiplied by the number of years of creditable service at date of retirement reduced by the lesser of:

(i) 1/3 of 1% for each month by which his or her age is less than 55,

(ii) 5% times the difference between 30 years and creditable service at retirement plus 4% times the difference between age 50 and the member's age at retirement.

Deferred Retirement Allowance

Any member who separates from service after completing five or more years of membership service prior to becoming eligible for an unreduced or reduced retirement allowance and who leaves his or her total accumulated contributions in the system may receive a deferred retirement allowance, beginning at age 60 (55), computed in the same way as a reduced retirement allowance, or, if the member has 20 (15) or more years of service, at age 50 computed in the same way as a reduced service retirement allowance, on the basis of creditable service and compensation to the date of separation.

Return of Contributions

Upon the withdrawal of a member without a retirement allowance and upon his or her request, the member's contributions are returned, together with accumulated regular interest.

Upon the death of a member before retirement, his or her contributions, together with the full accumulated regular interest thereon, are paid to his or her estate or to person(s) designated by the member unless the designated beneficiary, if eligible, elects the survivor's alternate benefit described below.

The current interest rate on member contributions is 4%.

Appendix B: Summary of Main Benefit and Contribution Provisions (continued)

Survivor's Alternate Benefit

Upon the death of a member in service who has met conditions (a) or (b) below, his or her designated beneficiary may elect to receive a benefit equal to that which would have been payable under the provisions of Option 2 had the member retired on the first day of the month following his or her death and elected such option, in lieu of the member's accumulated contributions, provided the member had not instructed the Board of Trustees in writing that he or she did not wish the alternate benefit to apply.

a) age 60 (55) and completion five years of membership (creditable) service; or

b) completion of 20 years of creditable service.

Members receiving a benefit from the Disability Income Plan are eligible for this benefit.

Death After Retirement

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 or Option 3, an 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.

Upon the death of a beneficiary, a benefit may be provided by the Retirees' Contributory Death Benefit Plan.

Other Death Benefits

Upon the death of a member in service, other benefits may be provided by the Death Benefit Plan or Separate Insurance Benefit Plan for Law Enforcement Officers.

Optional Arrangements at Retirement

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 or her death within 10 years from his or her retirement date, an amount equal to his or her accumulated contributions at retirement, less 1/120 for each month he has received a retirement allowance, is paid to his or her estate, or to a person(s) 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 his or her 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 his or her retirement.

Option 4 A member may elect to receive a retirement allowance in such an amount that, together with his or her Social Security benefit, he or she 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.

Option 5 A member retiring prior to July 1, 1993 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.

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.

Appendix B: Summary of Main Benefit and Contribution Provisions (continued)

Post-Retirement Increases in Allowances

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

Service Reciprocity

For the purpose of determining eligibility for a deferred, reduced or unreduced service retirement allowance, the membership and creditable service of a member shall include such prior service earned as a member of the Local Governmental Employees' Retirement System (LGERS), the Consolidated Judicial Retirement System (CJRS), or the Legislative Retirement System (LRS). In addition, if the member's accumulated contributions and reserves are transferred from the prior System to this System, the creditable service earned as a member of the prior System may be included for purposes of determining the amount of benefits payable under this System.

Military Service

For periods of active duty in the United States military may be counted as creditable service if the member was an employee upon entering the military and returned to employment within two years of discharge or for a period of 10 additional years.

Service Purchases

Additional creditable service may include service that the member purchased to restore a period of service for which the member:

1) received a refund of contributions,
2) had a leave of absence for educational purposes, extended illness or parental or maternity reasons,
3) had full-time temporary or part-time local or State government employment,
4) was in a probationary or waiting period with a unit of the LGERS,
5) had a leave of absence under Workers' Compensation,
6) performed service with a unit of local government not covered by LGERS,
7) performed service with the federal government or to another state not covered by any other retirement system,
8) performed service with a public community service entity funded entirely with federal funds,
9) performed service as a member of the General Assembly,
10) performed service as a member of a charter school not participating in the system,
11) was employed by The University of North Carolina and participated in the Optional Retirement Program but not eligible to receive any benefits from that program, or
12) performed service which was omitted by reason of error.

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.

Appendix B: Summary of Main Benefit and Contribution Provisions (continued)

Transfer of Defined Contribution Balances (Special Retirement Allowances)

A member may make a one-time election to transfer any portion of their eligible accumulated contributions to this plan on or after retirement. Eligible accumulated contributions are those from the Supplemental Retirement Income Plan or Public Employee Deferred Compensation Plan, not including Roth after-tax contributions. A member who became a member of the Supplemental Retirement Income Plan prior to retirement and who remains a member of the Supplemental Retirement Income Plan may also make a one-time election to transfer eligible balances, not including any Roth after-tax contributions, from any of the following plans to the Supplemental Retirement Income Plan, subject to the applicable requirements of the Supplemental Retirement Income Plan, and then through the Supplemental Retirement Income Plan to this Retirement System:

1) A plan participating in the North Carolina Public School Teachers' and Professional Educators' Investment Plan.
2) A plan described in section 403(b) of the Internal Revenue Code.
3) A plan described in section 457(b) of the Internal Revenue Code that is maintained by a state, political subdivision of a state, or any agency or instrumentality of a state or political subdivision of a state.
4) An individual retirement account or annuity described in Section 408(a) or 408(b) of the Internal Revenue Code that is eligible to be rolled over and would otherwise be includible in gross income.
5) A tax-qualified plan described in section 401(a) or 403(a) of the Internal Revenue Code.

The member may elect to convert the accumulated contributions to a life annuity with or without annual increases equal to the annual increase in the U.S. Consumer Price Index. Any ad-hoc COLA increases granted will not apply to benefits under this section. A member may elect Options 2, 3, or 6 under the Plan and may also elect either a guaranteed number of months of payments or a guarantee of total payments at least equal to the amount of contributions transferred to the Plan. In addition, any transfer may be paid in whole or in part with employer contributions paid directly to the Retirement System at the time of transfer.

Contributions

Member Contributions

Each member contributes 6% of his or her compensation.

Employer Contributions

Employers make 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.

The minimum total employer contribution rate is 6.00%.

Changes Since Prior Valuation

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 TSERS 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.

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.

Separations From Active Service

Representative values of the assumed rates of separation from active service are as follows:

Rates of Withdrawal

Up to five years of membership								
	General Employees		Teachers, Librarians, and Counselors		Law Enforcement Officers		Other Education	
Service	Male	Female	Male	Female	Male	Female	Male	Female
0	0.0900	0.0900	0.0500	0.0350	0.0350	0.0350	0.0900	0.0700
1	0.1700	0.1750	0.1750	0.1650	0.0925	0.0925	0.1900	0.1750
2	0.1500	0.1575	0.1550	0.1550	0.0925	0.0925	0.1700	0.1550
3	0.1250	0.1400	0.1450	0.1375	0.0950	0.0950	0.1300	0.1250
4	0.1100	0.1150	0.1150	0.1150	0.0800	0.0800	0.1100	0.1075

After five years of membership								
	General Employees		Teachers, Librarians, and Counselors		Law Enforcement Officers		Other Education	
Service	Male	Female	Male	Female	Male	Female	Male	Female
25	0.2500	0.2500	0.3000	0.3500	0.0750	0.0750	0.2500	0.2500
30	0.1250	0.1200	0.0900	0.1000	0.0750	0.0750	0.1000	0.1500
35	0.0750	0.1000	0.0600	0.0575	0.0350	0.0350	0.0550	0.0750
40	0.0500	0.0575	0.0475	0.0400	0.0250	0.0250	0.0500	0.0650
45	0.0400	0.0400	0.0375	0.0350	0.0200	0.0200	0.0500	0.0475
50	0.0400	0.0400	0.0425	0.0400	0.0200	0.0200	0.0500	0.0450
55	0.0400	0.0400	0.0425	0.0400			0.0400	0.0350
60	0.0400	0.0400	0.0425	0.0400			0.0400	0.0350

Appendix C: Actuarial Assumptions and Methods (continued)

Annual Rates of Mortality for Employees

(Base rates using Pub-2010 Amount weighted)

	General Employees		Teachers, Librarians, and Counselors		Law Enforcement Officers		Other Education	
Service	Male	Female	Male	Female	Male	Female	Male	Female
25	0.00028	0.00009	0.00016	0.00009	0.00037	0.00020	0.00028	0.00009
30	0.00036	0.00015	0.00022	0.00014	0.00041	0.00027	0.00036	0.00015
35	0.00047	0.00023	0.00030	0.00020	0.00047	0.00036	0.00047	0.00023
40	0.00066	0.00036	0.00042	0.00031	0.00059	0.00049	0.00066	0.00036
45	0.00098	0.00056	0.00067	0.00048	0.00082	0.00067	0.00098	0.00056
50	0.00149	0.00083	0.00111	0.00073	0.00120	0.00091	0.00149	0.00083
55	0.00219	0.00123	0.00172	0.00107	0.00175	0.00123	0.00219	0.00123
60	0.00319	0.00186	0.00264	0.00161	0.00264	0.00168	0.00319	0.00186
65	0.00468	0.00296	0.00435	0.00270	0.00410	0.00228	0.00468	0.00296
70	0.00703	0.00489	0.00709	0.00485	0.00766	0.00454	0.00703	0.00489
74	0.01001	0.00731	0.00993	0.00809	0.01263	0.00787	0.01001	0.00731

Annual Rates of Disability

Active Members with 5 or more years of service as of January 1, 1988

	General Employees		Teachers, Librarians, and Counselors		Law Enforcement Officers		Other Education	
Service	Male	Female	Male	Female	Male	Female	Male	Female
25	0.00020	0.00024	0.00006	0.00018	0.00330	0.00330	0.00020	0.00024
30	0.00040	0.00040	0.00012	0.00026	0.00430	0.00430	0.00040	0.00040
35	0.00100	0.00100	0.00030	0.00060	0.00600	0.00600	0.00100	0.00100
40	0.00300	0.00180	0.00066	0.00102	0.00790	0.00790	0.00300	0.00180
45	0.00500	0.00320	0.00138	0.00178	0.01100	0.01100	0.00500	0.00320
50	0.00840	0.00500	0.00234	0.00316	0.01760	0.01760	0.00840	0.00500
55	0.01440	0.00880	0.00474	0.00554	0.03070	0.03070	0.01440	0.00880
60	0.02400	0.01380	0.00768	0.01020	0.06010	0.06010	0.02400	0.01380
64	0.03160	0.01780	0.01124	0.01392	0.11210	0.11210	0.03160	0.01780

Appendix C: Actuarial Assumptions and Methods (continued)

Retirements

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

Annual Rates of Retirement

General Employees

Male	Service						
Age	5	10	15	20	25	30	35
50				0.030	0.040	0.600	0.600
55				0.030	0.040	0.350	0.350
60	0.090	0.070	0.070	0.100	0.225	0.270	0.270
65	0.180	0.250	0.250	0.300	0.400	0.300	0.300
70	0.180	0.250	0.225	0.225	0.250	0.300	0.300
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Female	Service						
Age	5	10	15	20	25	30	35
50				0.035	0.040	0.400	0.400
55				0.040	0.040	0.250	0.250
60	0.070	0.080	0.090	0.095	0.200	0.250	0.250
65	0.200	0.250	0.300	0.300	0.350	0.300	0.300
70	0.150	0.200	0.225	0.250	0.350	0.300	0.300
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Teachers, Librarians, and Counselors

Male	Service						
Age	5	10	15	20	25	30	35
50				0.030	0.030	0.700	0.700
55				0.045	0.030	0.450	0.450
60	0.085	0.080	0.100	0.100	0.300	0.300	0.300
65	0.175	0.225	0.250	0.325	0.400	0.250	0.250
70	0.175	0.225	0.250	0.250	0.250	0.300	0.300
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Female	Service						
Age	5	10	15	20	25	30	35
50				0.050	0.045	0.750	0.750
55				0.050	0.045	0.375	0.375
60	0.080	0.100	0.100	0.130	0.250	0.375	0.375
65	0.250	0.300	0.250	0.350	0.475	0.400	0.400
70	0.225	0.250	0.300	0.300	0.300	0.325	0.325
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Appendix C: Actuarial Assumptions and Methods (continued)

Law Enforcement Officers

	Service						
Age	5	10	15	20	25	30	35
50			0.040	0.050	0.050	0.800	0.800
55	0.200	0.200	0.350	0.350	0.500	0.650	0.650
60	0.100	0.200	0.125	0.250	0.250	0.500	0.500
65	0.150	0.450	0.250	0.250	0.250	0.500	0.500
70	0.250	0.150	0.250	0.250	0.250	0.500	0.500
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Other Education

Male	Service						
Age	5	10	15	20	25	30	35
50				0.035	0.045	0.500	0.500
55				0.040	0.050	0.300	0.300
60	0.080	0.070	0.100	0.090	0.200	0.275	0.275
65	0.100	0.250	0.250	0.300	0.275	0.275	0.275
70	0.100	0.250	0.250	0.225	0.300	0.350	0.350
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Female	Service						
Age	5	10	15	20	25	30	35
50				0.045	0.045	0.500	0.500
55				0.045	0.060	0.300	0.300
60	0.070	0.090	0.100	0.100	0.300	0.300	0.300
65	0.175	0.250	0.250	0.300	0.350	0.350	0.350
70	0.150	0.200	0.225	0.200	0.275	0.350	0.350
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Salary Merit Increases

Total assumed salary increases are these merit rates combined with the wage inflation assumption of 3.25% (2.50% price inflation plus 0.75% real wage growth). Representative values of the assumed annual rates of salary merit increases are as follows:

Service	General Employees	Teachers, Librarians and Counselors	Law Enforcement Officers	Other Education
0	3.00%	4.05%	4.80%	4.25%
5	1.80%	2.87%	3.10%	2.65%
10	1.10%	2.04%	2.00%	1.85%
15	0.60%	1.13%	0.80%	1.33%
20	0.50%	0.00%	0.80%	0.83%
25	0.40%	0.00%	0.80%	0.33%
30	0.00%	0.00%	0.40%	0.00%
>=35	0.00%	0.00%	0.00%	0.00%

Appendix C: Actuarial Assumptions and Methods (continued)

Post-Retirement Mortality

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

Annual Rates of Post-Retirement Mortality (members healthy at retirement)

	General Employees		Teachers, Librarians, and Counselors		Law Enforcement Officers		Other Education	
Service	Male	Female	Male	Female	Male	Female	Male	Female
55	0.00455	0.00272	0.00335	0.00266	0.00327	0.00279	0.00455	0.00272
60	0.00649	0.00365	0.00471	0.00344	0.00549	0.00482	0.00649	0.00365
65	0.00963	0.00582	0.00672	0.00456	0.00957	0.00832	0.00963	0.00582
70	0.01610	0.01010	0.01183	0.00789	0.01711	0.01438	0.01610	0.01010
75	0.02818	0.01789	0.02187	0.01499	0.03085	0.02483	0.02818	0.01789
80	0.05037	0.03360	0.04030	0.02895	0.05571	0.04287	0.05037	0.03360

Annual Rates of Post-Retirement Mortality (survivor and members disabled at retirement)

	Contingent Survivors of Deceased members		Members Disabled at Retirement			
	All Survivors		Non - Law Enforcement Officers		Law Enforcement Officers	
Age	Male	Female	Male	Female	Male	Female
55	0.01147	0.00742	0.02355	0.01692	0.01818	0.01587
60	0.01450	0.00975	0.02785	0.01914	0.02280	0.01833
65	0.02086	0.01332	0.03524	0.02178	0.02677	0.02051
70	0.03221	0.01931	0.04599	0.02706	0.03353	0.02450
75	0.04971	0.02946	0.06347	0.03718	0.04344	0.03239
80	0.07802	0.04698	0.09259	0.05517	0.05921	0.04678

Mortality Assumption

All mortality rates use Pub-2010 amount-weighted tables.

Mortality Projection

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

Deaths After Retirement (General Employees and Other Education)

Mortality rates are based on the General Mortality Table for Retirees. Rates for male members are multiplied by 105.5% at all ages. Rates for female members are multiplied by 95% for ages under 76, increased by 1% for each age up to age 90 and by 110% for all ages greater than 89. Because the retiree tables have no rates prior to age 50, the General Mortality Table for Employees is used for ages less than 50.

Appendix C: Actuarial Assumptions and Methods (continued)

Deaths After Retirement (Teachers)

Mortality rates are based on the Below-median Teachers Mortality Table for Retirees. Rates for male members are multiplied by 96% for ages under 83, increased by 2% for each age up to 87 and by 106% for all ages greater than 86. Rates for female members are multiplied by 101% for age 81, increased by 1% for each age up to 85, and by 105% for all ages greater than 84. Because the retiree tables have no rates prior to age 55, the Below-median Teachers Mortality Table for Employees is used for ages less than 55.

Deaths After Retirement (Law Enforcement Officers)

Mortality rates are based on the Safety Mortality Table for Retirees. Rates for all members are multiplied by 97% and Set Forward by 1 year. Because the retiree tables have no rates prior to age 45, the Safety Mortality Table for Employees is used for ages less than 45.

Deaths After Retirement (Survivors of Deceased Members)

Mortality rates are based on the 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 45.

Deaths After Retirement (Disabled Members at Retirement)

Mortality rates are based on the General Mortality Table for Disabled Retirees. Rates for male members not in Law Enforcement are Set Forward 3 years, while male members in Law Enforcement are Set Back 3 years. Rates for female members not in Law Enforcement are Set Back 1 year, while female members in Law Enforcement are Set Back 3 years.

Deaths Prior to Retirement

Mortality rates for the general and other education groups are based on the General Mortality Table for Employees. Mortality rates for teachers are based on the Teachers Mortality Table for Employees. Mortality rates for law enforcement officers are based on the Safety Mortality Table for Employees.

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.

Appendix C: Actuarial Assumptions and Methods (continued)

Leave Conversions

Sick leave can be converted to increase creditable service and used to meet the eligibility requirements for retirement. Unused vacation leave can be converted to increase creditable service or compensation but does not add to the eligibility service. The assumed impact of these conversions is shown in the table below.

		General Employees		Teachers, Librarians and Counselors		Law Enforcement Officers		Other Education	
		Male	Female	Male	Female	Male	Female	Male	Female
Increase in AFC (percentage) – Unused Vacation Leave		2.50%	2.50%	2.00%	2.00%	1.75%	1.75%	1.75%	1.75%
Increase in Service (yrs) – Unused Sick Leave	Credited	0.85	0.55	0.90	0.70	1.50	1.50	1.05	0.80
	Eligibility	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Liability for Inactive Members

For inactive members with five or more years of service without actual deferred benefit amounts, a deferred benefit amount is estimated based on available data and contribution balances projecting backwards assuming 4% salary growth and 4% interest on contribution balances where necessary. For inactive members with less than five years of service the liability is equal to the member's accumulated contributions.

Administrative Expenses

0.10% of payroll added to the normal cost rate.

Marriage Assumption

100% married with 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 inspection.

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.

Compensation for members receiving DIPNC benefits

Compensation earned as of the disability benefit effective date is increased by inflation to the valuation date.

Compensation Limits

No compensation limits are applied.

Actuarial Cost Method

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

Appendix C: Actuarial Assumptions and Methods (continued)

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 10. The actuarial value of assets is based upon a smoothed market value method. Under this method, asset returns in excess of or less than the expected return on market value of assets will be reflected in the actuarial value of assets over a five-year period. The Actuarial Value of Assets was reset to the market value of assets at December 31, 2014. 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:

None. 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%	7.76%	9.03%
Market Value of Assets	$ 77,445,236,928	$ 77,445,236,928	$ 77,445,236,928	$ 77,445,236,928	$ 77,445,236,928
Actuarial Accrued Liability	$ 131,882,429,876	$ 111,997,829,595	$ 96,675,255,859	$ 84,557,271,095	$ 74,967,536,531
Unfunded Accrued Liability (UAAL)	$ 54,437,192,948	$ 34,552,592,667	$ 19,230,018,931	$ 7,112,034,167	$ (2,477,700,397)
Funded Ratio	58.7%	69.1%	80.1%	91.6%	103.3%
20-Year Amortization of UAL	$ 4,153,539,725	$ 2,977,531,079	$ 1,858,675,369	N/A	N/A
(as % of general state revenue)	9.4%	6.8%	4.2%	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: Statistical Likelihood of Minimum Future Asset Returns as of 12/31/2022

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.

Appendix E: Participating Employers

Employer	Employer Code	Employer	Employer Code
A Childs Garden Charter (AKA Cross Creek Charter)	33501	Carteret County Schools	31600
Academy of Moore County	36301	Caswell County Schools	31700
Administrative Office of the Courts	10800	Catawba County Schools	31800
Alamance Community College	30105	Catawba Valley Community College	31805
Alamance Community School	32915	Central Carolina Community College	35305
Alamance County Schools	30100	Central Park Sch for Children	33202
Alexander County Schools	30200	Central Piedmont Community College	36005
Alleghany County Schools	30300	Chapel Hill - Carrboro City Schools	36810
American Renaissance Mid School	34901	Charlotte Secondary Charter	36009
Anson County Schools	30400	Charlotte-Mecklenburg County Schools	36000
Appalachian State University	20100	Chatham County Schools	31900
Arapahoe Charter School	36901	Cherokee County Schools	32000
Arts Based Elementary Charter	33402	Childrens Village Academy	35401
Ashe County Schools	30500	Clay County Schools	32200
Asheboro City Schools	37610	Cleveland Community College	32305
Asheville City Schools	31110	Cleveland County Schools	32300
Asheville-Buncombe Technical College	31105	Clinton City Schools	38210
Avery County Schools	30600	Clover Garden Charter School	30102
Barber Examiners, State Board Of	18600	Coastal Carolina Community College	36705
Bear Grass Charter School	33206	College of the Albemarle	37005
Beaufort County Community College	30705	Columbus County Schools	32400
Beaufort County Schools	30700	Community Colleges Administration	19005
Bertie County Schools	30800	Community School of Davidson	36003
Bethany Community Middle School	37901	Cornerstone Academy	33027
Bladen Community College	30905	Corvian Community Charter School	36004
Bladen County Schools	30900	Craven Community College	32505
Blue Ridge Community College	34505	Cumberland County Schools	32600
Brevard Academy Charter School	38801	Currituck County Schools	32700
Brunswick Community College	31005	Dare County Schools	32800
Brunswick County Schools	31000	Davidson County Schools	32900
Buncombe County Schools	31100	Davidson-Davie Community College	32905
Burke County Schools	31200	Davie County Schools	33000
Cabarrus County Schools	31300	Department of Administration	10900
Caldwell Community College	31405	Department of Adult Corrections	19120
Caldwell County Schools	31400	Department of Commerce	12510
Camden County Schools	31500	Department of Justice	10400
Cape Fear Community College	36505	Department of Natural and Cultural Resources	10700
Cape Fear Ctr for Inquiry	36501	Department of Public Instruction	22000
Carolina International School	31301	Department of Public Safety	19100
Carteret Community College	31605	Dept of Agriculture & Consumer Svcs.	18400

Appendix E: Participating Employers (continued)

Employer	Employer Code	Employer	Employer Code
Discovery Charter	32904	Hertford County Schools	34600
Duplin County Schools	33100	Hickory City Schools	31810
Durham Public Schools	33200	Highway - Administrative	51000
Durham Technical Institute	33205	Hoke County Schools	34700
East Carolina University	20300	Hyde County Schools	34800
East Wake First Academy	39208	Information Technology Services	10930
Edenton-Chowan County Schools	32100	Insurance Department	12600
Edgecombe County Schools	33300	Invest Collegiate Charter (Buncombe)	33207
Edgecombe Technical College	33305	Invest Collegiate Charter (Davidson)	32901
Elizabeth City and Pasquotank County Schools	37000	Iredell-Statesville Schools	34900
Elizabeth City State University	20400	Isothermal Community College	38105
Elkin City Schools	38620	Jackson County Schools	35000
Endeavor Charter School	39201	James Sprunt Technical College	33105
Evergreen Community Charter School	31102	Johnston County Schools	35100
F Delany New School for Children	31101	Johnston Technical College	35105
Fayetteville State University	20600	Jones County Schools	35200
Fayetteville Technical Community College	32605	Kannapolis City Schools	31320
Forsyth Technical Communiity College	33405	Labor Department	12700
Franklin County Schools	33500	Lake Norman Charter School	36006
Gaston College	33605	Lee County Board of Education	35300
Gaston County Schools	33600	Lenoir County Community College	35405
Gates County Schools	33700	Lenoir County Schools	35400
General Assembly	12160	Lexington City Schools	32910
Governor's Office	12100	Lincoln County Schools	35500
Graham County Schools	33800	Lt Governor's Office	12150
Granville County Public Schools	33900	Macon County Schools	35600
Gray Stone Day School	38402	Madison County Schools	35700
Greene County Schools	34000	Martin Community College	35805
Guilford County Schools	34100	Martin County Schools	35800
Guilford Technical Community College	34105	Mayland Technical College	36105
Halifax Community College	34205	Mcdowell County Schools	35900
Halifax County Schools	34200	Mcdowell Technical College	35905
Haliwa-Saponi Tribal Charter	39301	Millennium Charter Academy	38602
Harnett County Schools	34300	Mitchell Community College	34905
Haywood County Schools	34400	Mitchell County Schools	36100
Haywood Technical College	34405	Montgomery Community College	36205
Health and Human Svcs	12220	Montgomery County Schools	36200
Healthy Start Academy	33203	Moore County Schools	36300
Henderson Collegiate Charter School	39401	Mooresville City Schools	34910
Henderson County Schools	34500	Mount Airy City Schools	38610

Appendix E: Participating Employers (continued)

Employer	Employer Code	Employer	Employer Code
Mountain Community School	34501	Randolph Community College	37605
Mtn Discovery Charter	38701	Randolph County Schools	37600
N.E. Academy of Aerospace & Adv.Tech	37001	Revenue Department	13500
N.E. Regional School for Biotechnology	33001	Richmond County Schools	37700
Nash Community College	36405	Richmond Technical College	37705
Nash County Public Schools	36400	River Mill Academy Charter	30103
NC A&T University	20700	Roanoke Rapids City Schools	34220
NC Auctioneers Licensing Board	18740	Roanoke-Chowan Community College	34605
NC Brd of Examiners of Practicing Psycologists	18780	Robeson Community College	37805
NC Central University	20800	Robeson County Schools	37800
NC Department of Military & Veterans Affairs	11050	Rockingham Community College	37905
NC Dept of Environmental Quality	11300	Rockingham County Schools	37900
NC Housing Finance Agency	11310	Rowan-Cabarrus Community College	38005
NC School of Science & Mathematics	10950	Rowan-Salisbury School System	38000
NC School of the Arts	20200	Roxboro Community School	37301
NC State University	21300	Rutherford County Schools	38100
Neuse Charter School	35106	Sampson Community College	38205
New Bern Craven County Board of Education	32500	Sampson County Schools	38200
New Hanover County Schools	36500	Sandhills Community College	36305
Newton-Conover City Schools	31820	Scotland County Schools	38300
North Carolina Board of Opticians	18640	Secretary of State	13700
North Carolina Education Lottery	10200	Socrates Academy	36007
Northampton County Schools	36600	South Piedmont Community College	30405
Office of Administrative Hearing	10850	Southeastern Academy Charter School	37801
Office of State Budget & Management	10910	Southeastern Community College	32405
Office of State Controller	10940	Southern Wake Academy	39204
Onslow County Schools	36700	Southwestern Community College	35005
Orange Charter School	36802	Stanly Community College	38405
Orange County Schools	36800	Stanly County Schools	38400
Pamlico Community College	36905	Stars Charter School	36302
Pamlico County Schools	36900	State Auditor	10500
Pender County Schools	37100	State Board of Elections	11900
Perquimans County Schools	37200	State Treasurer	14300
Person County Schools	37300	Stokes County Schools	38500
Piedmont Community College	37305	Success Institute	34903
Pine Lake Prep Charter	36008	Surry Community College	38605
Pinnacle Classical Academy	39703	Surry County Schools	38600
Pitt Community College	37405	Swain County Schools	38700
Pitt County Schools	37400	The Hawbridge School	30104
Polk County Schools	37500	The North Carolina Leadership Academy	36303

Appendix E: Participating Employers (continued)

Employer	Employer Code	Employer	Employer Code
Thomasville City Schools	32920	Wayne Community College	39605
Transylvania County Schools	38800	Wayne County Schools	39600
Tri-County Community College	32005	Weldon City Schools	34230
Two Rivers Comm School	39501	Western Carolina University	21800
Tyrrell County Schools	38900	Western Piedmont Comm College	31205
UNC - Pembroke	21200	Whiteville City Schools	32410
UNC Health Care System	21550	Wildlife Resources Commission	11600
UNC-Chapel Hill Cb1260	21520	Wilkes Community College	39705
UNC-System Office	21525	Wilkes County Schools	39700
Union County Schools	39000	Wilmington Prep Academy	36502
University of North Carolina at Asheville	23000	Wilson Community College	39805
University of North Carolina at Charlotte	23100	Wilson County Schools	39800
University of North Carolina at Greensboro	20900	Winston-Salem State University	21900
University of North Carolina at Wilmington	23200	Winston-Salem-Forsyth County Schools	33400
University of North Carolina Press	21570	Yadkin County Schools	39900
Uwharrie Charter Academy	37601	Yancey County Schools	30000
Vance Charter School	39101	Zeca School of the Arts and Technology	36701
Vance County Schools	39100		
Vance-Granville Community College	39105		
Voyager Academy	33204		
Wake County Public Schools System	39200		
Wake Technical College	39205		
Warren County Schools	39300		
Washington County Schools	39400		
Watauga County Schools	39500		

Appendix F: ECRSP Policy

Teachers' and State Employees' Retirement System Board of Trustees

Employer Contribution Rate Stabilization Policy for the Teachers' and State Employees' Retirement System

This ECRSP policy was adopted by the TSERS Board of Trustees at its meeting on April 29, 2021.

Policy Purpose

This policy provides for continued operation of an Employer Contribution Rate Stabilization Policy (ECRSP) for the Teachers' and State Employees' Retirement System (TSERS). On January 21, 2016, the Board of Trustees (Board) of TSERS approved an ECRSP to be in place for fiscal years ending 2017 through 2022. Having adopted the Experience Study of the 2015- 2019 calendar years on January 28, 2021, which will be effective for plan funding purposes for fiscal years ending 2023 and later, the Board wishes to institute an ECRSP effective for contributions during the five fiscal years ending 2023 through 2027.

Policy Objectives

This policy establishes how the Board will develop an annual appropriation amount to recommend to the General Assembly to fund TSERS and to establish the "required employer contribution rate" pursuant to G.S. 135-8(d)(a3).

Definitions

- Actuarial Measurement
  The result of an analysis by the Board's consulting actuary, presented in a public report, based on actuarial assumptions and methods adopted by the Board for purposes of funding of TSERS.
- Policy Contribution
  The State appropriation to be recommended by the Board under this policy.
- Underlying Actuarially Determined Employer Contribution (Underlying ADEC)
  The amount developed annually by the Board's consulting actuary, representing a funding requirement according to the Board's actuarial assumptions and methods before applying this policy.

Annual Appropriation Recommendation

This policy calls for continuing the approach used for the fiscal years ending 2017 through 2022, whereby the Board recommends an appropriation at least equal to the Underlying ADEC, and also at least equal to the prior year's recommendation (as adjusted) plus 0.35% of retirement eligible compensation. This may result in an appropriation recommendation exceeding the Underlying ADEC.

Accordingly, for each year that this policy is in effect, the Policy Contribution recommended by the Board will be the greater of (1) the Underlying ADEC for the upcoming fiscal year or (2) 0.35% of eligible compensation greater than the appropriation recommended by the Board for the current fiscal year. However, if the Policy Contribution is determined by part (2) of the definition, it can be no greater than (3) the Underlying ADEC if it were determined using a discount rate equal to the annual yield on 30-year U.S. Treasury securities as of the date of the actuarial valuation used to determine the Underlying ADEC for the upcoming fiscal year.

In developing Parts (1) and (3) of this definition, the Underlying ADEC should be adjusted to include the effect of any benefit change enacted by the General Assembly that was not incorporated in the consulting actuary's annual valuation report. This adjustment should be equal to the Actuarial Measurement of the effect of the benefit change for purposes of the legislative actuarial note.

Appendix F: ECRSP Policy (continued)

Teachers' and State Employees' Retirement System Board of Trustees

Employer Contribution Rate Stabilization Policy for the Teachers' and State Employees' Retirement System (continued)

In developing Part (2) of this definition, this policy provides the following guidance.

- The appropriation that was recommended for the current fiscal year should be adjusted for the effect of any permanent cost-of-living allowance (COLA) or other permanent benefit change enacted by the General Assembly, taking effect during the current fiscal year, that was not incorporated in the Board's recommendation for the current fiscal year. This adjustment should be equal to the Actuarial Measurement of the effect of the benefit change on the Underlying ADEC for purposes of the legislative actuarial note.
- The appropriation that was recommended for the current fiscal year should be adjusted for the effect of any one-time supplemental payment (COLA supplements) enacted by the General Assembly, taking effect during the current fiscal year, that was not incorporated in the Board's recommendation for the current fiscal year, only if the General Assembly made a recurring appropriation associated with the supplemental payment. In that case, the adjustment should be equal to the percentage of eligible compensation equivalent to the recurring appropriation. Otherwise, the appropriation that was recommended for the current fiscal year should not be adjusted for the cost of a one-time supplemental payment.
- The appropriation that was recommended for the current fiscal year should be adjusted for the effect of any benefit change enacted by the General Assembly, taking effect during the upcoming fiscal year, including COLA supplements, that was not incorporated in the Board's recommendation for the current fiscal year. This adjustment should be equal to the Actuarial Measurement of the effect of the benefit change on the Underlying ADEC for purposes of the legislative actuarial note.
- The appropriation that was recommended for the current fiscal year should be adjusted for the effect of any changes in actuarial assumptions or methods adopted by the Board that were not incorporated in the Board's recommendation for the current fiscal year. The adjustment should be equal to the Actuarial Measurement of the effect on the Underlying ADEC.
- The appropriation that was recommended for the current fiscal year should exclude any appropriations to the Unfunded Liability Solvency Reserve for distribution to TSERS.

The Policy Contribution will be deemed by the Board to be the annual actuarially determined employer contribution (funding ADEC) and the "required employer contribution rate" for TSERS, pursuant to G.S. 135-8(d)(a3) as in effect at the date of adoption of this policy.

Policy Effective Date

This policy is effective through the fiscal year ending June 30, 2027. The Board may vote to extend it for any period of time.