



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

Principal Results of Actuarial Valuation as of December 31, 2021

October 27, 2022, Board of Trustees Meeting

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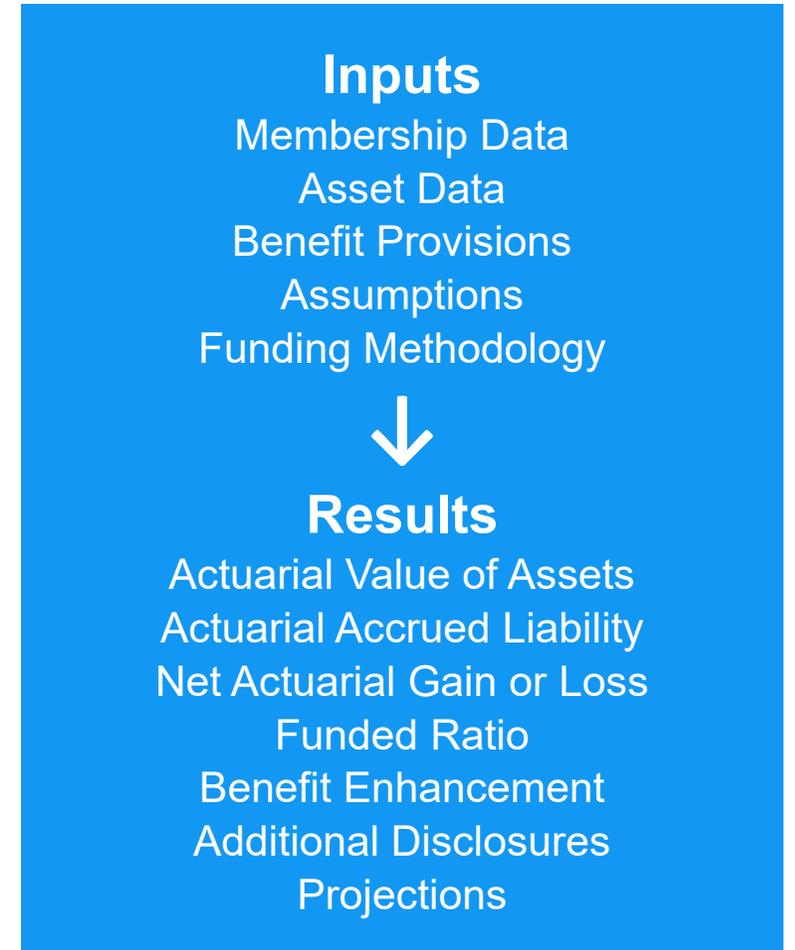
Elizabeth Wiley, FSA, EA, MAAA, FCA

# 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
- 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
  - 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 Appendix A of the actuarial report.
- This diagram will appear throughout the presentation to designate where we are in the process.



# Valuation input

## Membership data

### Inputs

Membership Data

Asset Data

Benefit Provisions

Assumptions

Funding Methodology



### Results

Actuarial Value of Assets

Actuarial Accrued Liability

Net Actuarial Gain or Loss

Funded Ratio

Employer Contributions

Benefit Enhancement

Additional Disclosures

Projections

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

Number as of	12/31/2021	12/31/2020
Active members	300,310	302,771
Members currently receiving Disability Income Plan benefits	4,961	5,410
Terminated members and survivors of deceased members entitled to benefits but not yet receiving benefits	198,642	185,465
Retired members and survivors of deceased members currently receiving benefits	<u>238,652</u>	<u>233,751</u>
Total	742,565	727,397

A detailed summary of the membership data used in this valuation is provided in Section 3 and Appendix B.

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 2.1% from the previous valuation.

The increase in retiree population is consistent with expectations.

# Valuation input

## Membership data: actives

**Inputs**

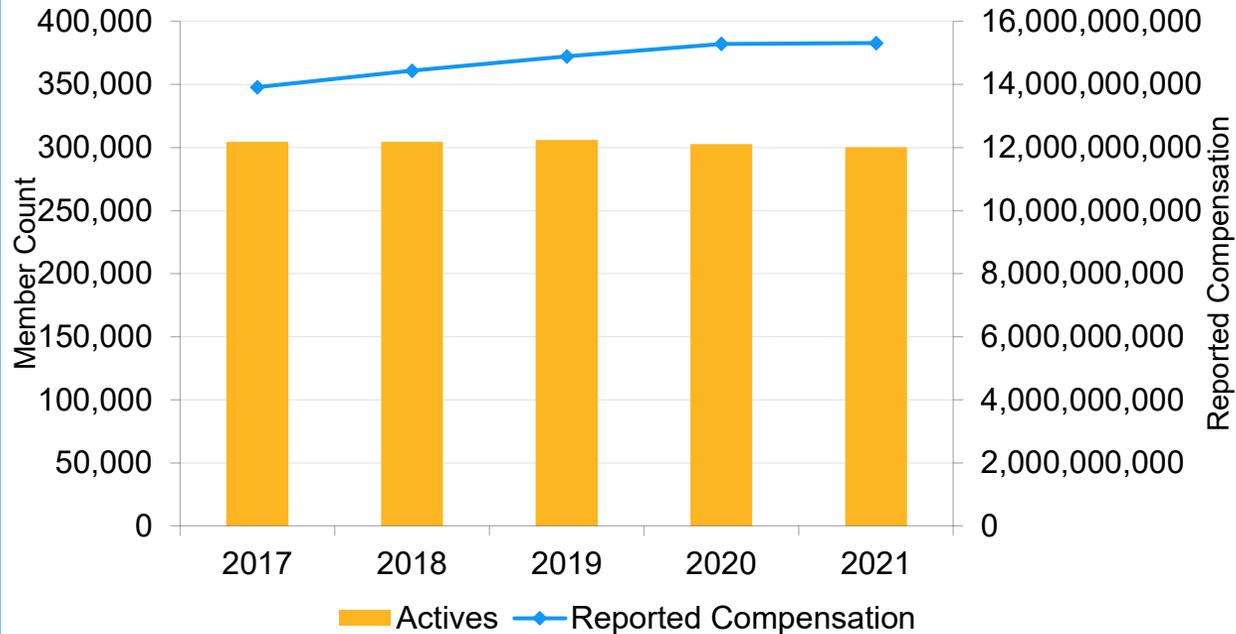
- Membership Data
- Asset Data
- Benefit Provisions
- Assumptions
- Funding Methodology

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**Results**

- Actuarial Value of Assets
- Actuarial Accrued Liability
- Net Actuarial Gain or Loss
- Funded Ratio
- Employer Contributions
- Benefit Enhancement
- Additional Disclosures
- Projections

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 3 and Appendix B.

Reported compensation has increased by 0.2% and has averaged 2.4% over the past four years.

Covered payroll is expected to increase by approximately 3.25% annually in the future.

Payroll that is not increasing as fast as we assume results in less benefits accruing than we anticipate, but also fewer contributions supporting the system.

# Valuation input

## Membership data: retirees and survivors receiving benefits

### Inputs

Membership Data

Asset Data

Benefit Provisions

Assumptions

Funding Methodology



### Results

Actuarial Value of Assets

Actuarial Accrued Liability

Net Actuarial Gain or Loss

Funded Ratio

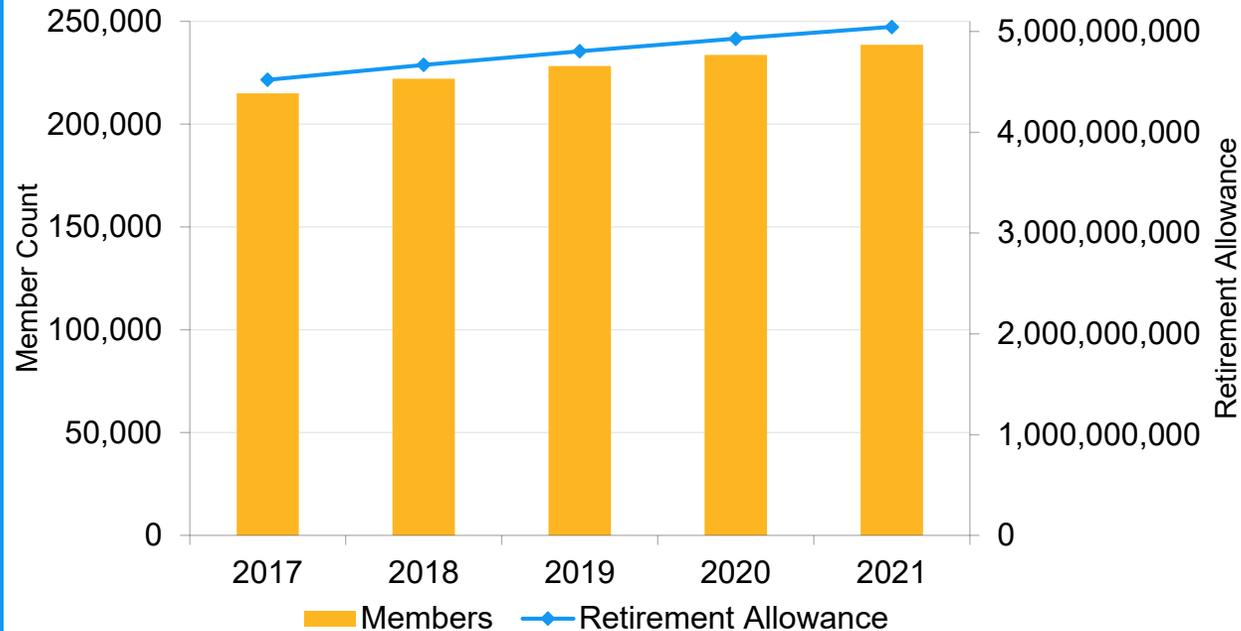
Employer Contributions

Benefit Enhancement

Additional Disclosures

Projections

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.



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.

A detailed summary of the membership data used in this valuation is provided in Section 3 and Appendix B.

# Valuation input

## Asset data: market value

Inputs

**Inputs**

Membership Data

**Asset Data**

Benefit Provisions

Assumptions

Funding Methodology

↓

**Results**

Actuarial Value of Assets

Actuarial Accrued Liability

Net Actuarial Gain or Loss

Funded Ratio

Employer Contributions

Benefit Enhancement

Additional Disclosures

Projections

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

Asset data as of	12/31/2021	12/31/2020
Beginning of year market value of assets	\$ 81,969,425,086	\$ 75,486,780,473
Employer contributions	2,403,844,588	2,220,834,130
Employee contributions	995,528,156	972,729,960
Benefit payments other than refunds	(5,123,832,896)	(4,890,953,170)
Refunds	(111,847,477)	(99,462,455)
Administrative expenses	(13,985,883)	(13,461,042)
Investment income	<u>7,847,220,944</u>	<u>8,292,957,190</u>
Net increase / (decrease)	5,996,927,432	6,482,644,613
End of year market value of assets	\$ 87,966,352,518	\$ 81,969,425,086
Estimated net investment return	9.68%	11.12%

A detailed summary of the market value of assets is provided in Section 4.

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

Incoming contributions currently cover over 60% 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 data: historical market value and returns

**Inputs**

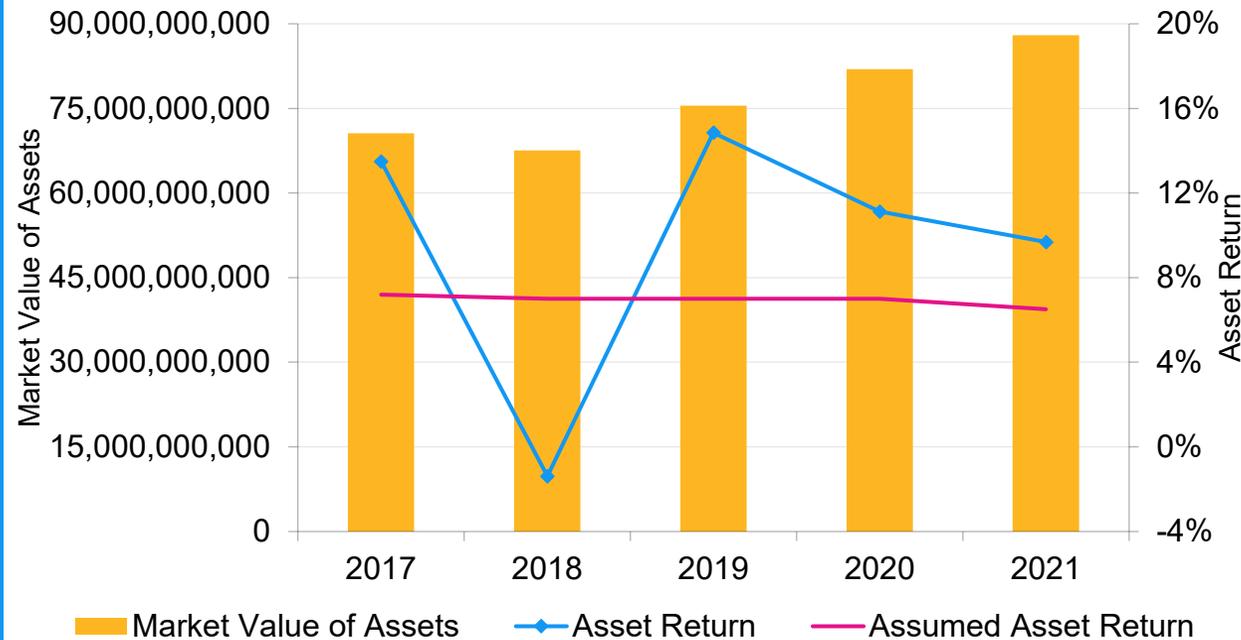
- Membership Data
- Asset Data**
- Benefit Provisions
- Assumptions
- Funding Methodology

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**Results**

- Actuarial Value of Assets
- Actuarial Accrued Liability
- Net Actuarial Gain or Loss
- Funded Ratio
- Employer Contributions
- Benefit Enhancement
- Additional Disclosures
- Projections

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 4.

The investment return for the market value of assets for 2021 was 9.68%, well above the expected return of 6.50%.

The return on the actuarial value of assets, which is used to determine the contribution rates, also exceeded the 6.50% expected return at 9.18%.

This resulted in a decrease in the unfunded actuarial accrued liability (UAAL) of \$2.1 billion.

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

# Valuation input

## Asset data: asset allocation

**Inputs**

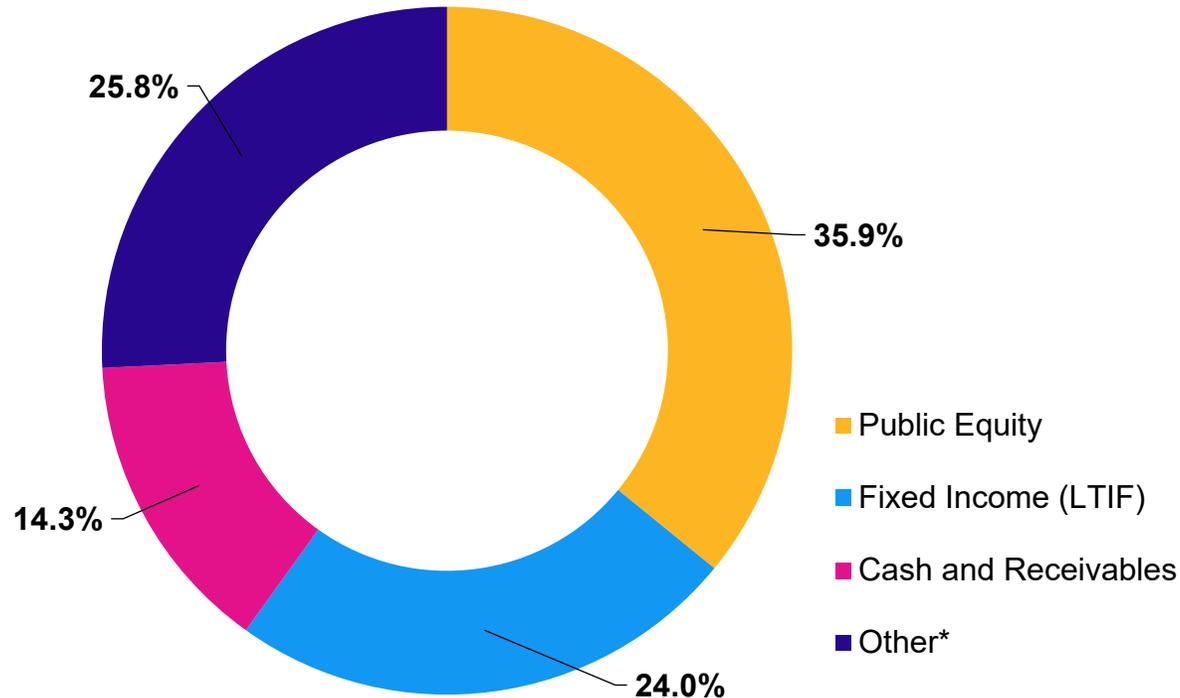
- Membership Data
- Asset Data**
- Benefit Provisions
- Assumptions
- Funding Methodology

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**Results**

- Actuarial Value of Assets
- Actuarial Accrued Liability
- Net Actuarial Gain or Loss
- Funded Ratio
- Employer Contributions
- Benefit Enhancement
- Additional Disclosures
- Projections

The graph below provides the breakdown of the market value of assets at December 31, 2021 by asset category.



\*Real estate, alternatives, inflation, and credit

A detailed summary of the market value of assets is provided in Section 4.

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

### Inputs

Membership Data

Asset Data

Benefit Provisions

Assumptions

Funding Methodology



### Results

Actuarial Value of Assets

Actuarial Accrued Liability

Net Actuarial Gain or Loss

Funded Ratio

Employer Contributions

Benefit Enhancement

Additional Disclosures

Projections

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 allowance for the fiscal year ending June 30, 2023, payable in October 2022.
- 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 C.

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 the actuarially determined employer contribution, benefit cuts have not been made in North Carolina as they have been in most other states.

Instead, we have seen a modest expansion of benefits in recent years based on sound plan design.

# Valuation input

## Actuarial assumptions

### Inputs

Membership Data

Asset Data

Benefit Provisions

Assumptions

Funding Methodology



### Results

Actuarial Value of Assets

Actuarial Accrued Liability

Net Actuarial Gain or Loss

Funded Ratio

Employer Contributions

Benefit Enhancement

Additional Disclosures

Projections

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 D.

The assumptions used for the December 31, 2021, 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

## Funding methodology: actuarial cost method

### Inputs

Membership Data  
Asset Data  
Benefit Provisions  
Assumptions

Funding Methodology



### Results

Actuarial Value of Assets  
Actuarial Accrued Liability  
Net Actuarial Gain or Loss  
Funded Ratio  
Employer Contributions  
Benefit Enhancement  
Additional Disclosures  
Projections

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 D.

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](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/ccappc\\_actuarial-funding-policies-and-practices-for-public-pension-plans.pdf](https://www.ccactuaries.org/docs/default-source/papers/ccappc_actuarial-funding-policies-and-practices-for-public-pension-plans.pdf) - denotes Entry Age Normal as a model practice for cost methods.

# Valuation input

## Funding methodology: asset valuation method

### Inputs

Membership Data  
Asset Data  
Benefit Provisions  
Assumptions

Funding Methodology



### Results

Actuarial Value of Assets  
Actuarial Accrued Liability  
Net Actuarial Gain or Loss  
Funded Ratio  
Employer Contributions  
Benefit Enhancement  
Additional Disclosures  
Projections

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 D.

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[https://www.ccactuaries.org/docs/default-source/papers/cca-ppc\\_actuarial-funding-policies-and-practices-for-public-pension-plans.pdf](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

## Funding methodology: amortization method

### Inputs

Membership Data  
Asset Data  
Benefit Provisions  
Assumptions

Funding Methodology



### Results

Actuarial Value of Assets  
Actuarial Accrued Liability  
Net Actuarial Gain or Loss  
Funded Ratio  
Employer Contributions  
Benefit Enhancement  
Additional Disclosures  
Projections

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 D.

Page 26 of the following -

[https://www.ccactuaries.org/docs/default-source/papers/cca-ppc\\_actuarial-funding-policies-and-practices-for-public-pension-plans.pdf](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

# Valuation results

## Actuarial value of assets: calculation

### Inputs

Membership Data  
Asset Data  
Benefit Provisions  
Assumptions  
Funding Methodology



### Results

Actuarial Value of Assets  
Actuarial Accrued Liability  
Net Actuarial Gain or Loss  
Funded Ratio  
Employer Contributions  
Benefit Enhancement  
Additional Disclosures  
Projections

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

Asset data as of	12/31/2021
Beginning of year actuarial value of assets	\$ 77,922,070,039
Beginning of year market value of assets	81,969,425,086
Total contributions	3,399,372,744
Benefit payments, refunds and administrative expenses	<u>(5,249,666,256)</u>
Net cash flow	(1,850,293,512)
Expected investment return	5,268,824,753
Expected end of year market value of assets	85,387,956,327
End of year market value of assets	87,966,352,518
Excess market value over expected market value of assets	2,578,396,191
80% of 2021 asset gain/(loss)	2,062,716,953
60% of 2020 asset gain/(loss)	1,842,703,122
40% of 2019 asset gain/(loss)	2,089,293,591
20% of 2018 asset gain/(loss)	<u>(1,167,819,246)</u>
Total deferred asset gain/(loss)	4,826,894,420
Preliminary end of year actuarial value of assets	83,139,458,098
Final end of year actuarial value of assets (not less than 80% and not greater than 120% of market value)	83,139,458,098
Estimated net investment return on actuarial value	9.18%

A detailed summary of the Actuarial Value of Assets is provided in Section 4.

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.

Higher than expected market returns in 2019, 2020, and 2021 resulted in an actuarial value of asset return for calendar year 2021 of 9.18% and a recognized actuarial asset gain of \$2.1 billion during 2021.

Even after recognizing this gain, the assets at actuarial value were \$9.2 billion less than the actuarial accrued liability as of December 31, 2021.

# Valuation results

## Actuarial value of assets: comparison to market values

### Inputs

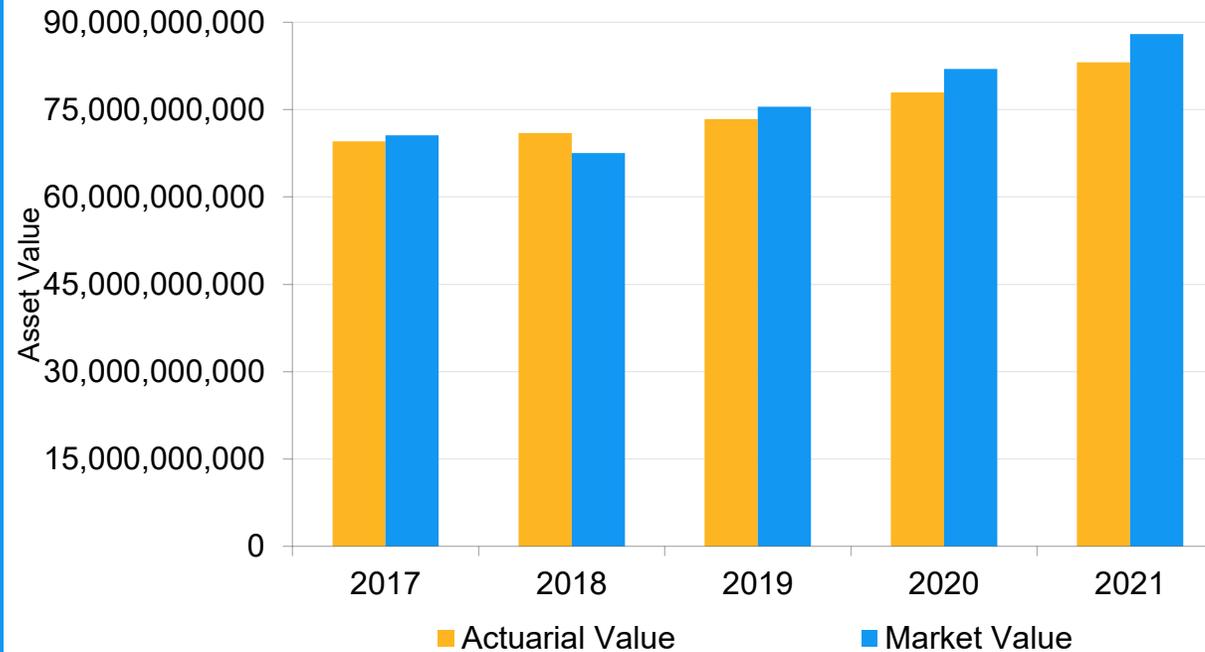
Membership Data  
Asset Data  
Benefit Provisions  
Assumptions  
Funding Methodology



### Results

Actuarial Value of Assets  
Actuarial Accrued Liability  
Net Actuarial Gain or Loss  
Funded Ratio  
Employer Contributions  
Benefit Enhancement  
Additional Disclosures  
Projections

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 4.

The market value of assets is higher than the actuarial value of assets, which is used to determine employer contributions.

This indicates that overall, there are unrecognized asset gains to be recognized in future valuations.

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

# Valuation results

## Actuarial value of assets: comparison to market returns

**Inputs**

- Membership Data
- Asset Data
- Benefit Provisions
- Assumptions
- Funding Methodology

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**Results**

- Actuarial Value of Assets
- Actuarial Accrued Liability
- Net Actuarial Gain or Loss
- Funded Ratio
- Employer Contributions
- Benefit Enhancement
- Additional Disclosures
- Projections

Calendar Year	Expected Asset Return	Actuarial Value of Asset Return	Market Value of Asset Return	20 Year Average Market Return
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	7.25%	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%
20-Yr Average	7.17%	6.73%	6.84%	NA
Range	0.75%	6.29%	37.73%	NA

A detailed summary of the Actuarial Value of Assets is provided in Section 4.

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 6.73% compares with an average market return of 6.84%.

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 value of assets: five-year return history

### Inputs

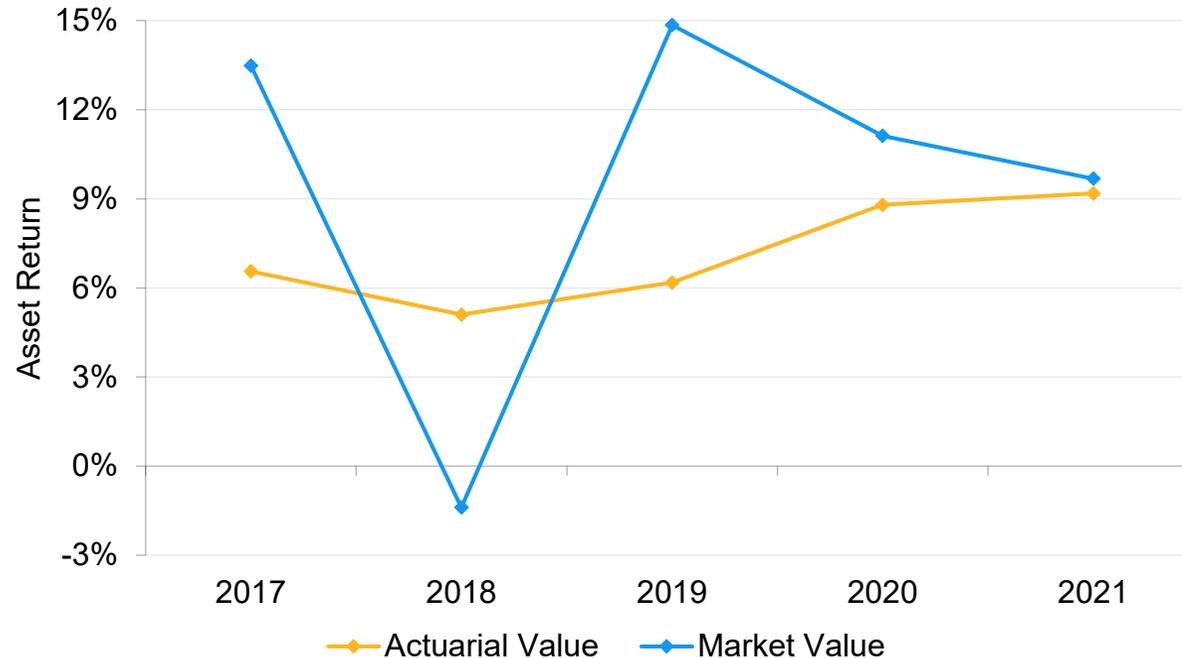
Membership Data  
Asset Data  
Benefit Provisions  
Assumptions  
Funding Methodology



### Results

Actuarial Value of Assets  
Actuarial Accrued Liability  
Net Actuarial Gain or Loss  
Funded Ratio  
Employer Contributions  
Benefit Enhancement  
Additional Disclosures  
Projections

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 4.

The investment return for the market value of assets for calendar year 2021 was 9.68%.

The actuarial value of assets smooths investment gains and losses.

Higher than expected market returns, in 2019, 2020, and 2021, resulted in an actuarial value of asset return for calendar year 2021 of 9.18% and a recognized actuarial asset gain of \$2.1 billion during 2021.

Even after recognizing this gain, the assets at actuarial value were \$9.2 billion less than the actuarial accrued liability as of December 31, 2021.

# Valuation results

## Actuarial accrued liability

### Inputs

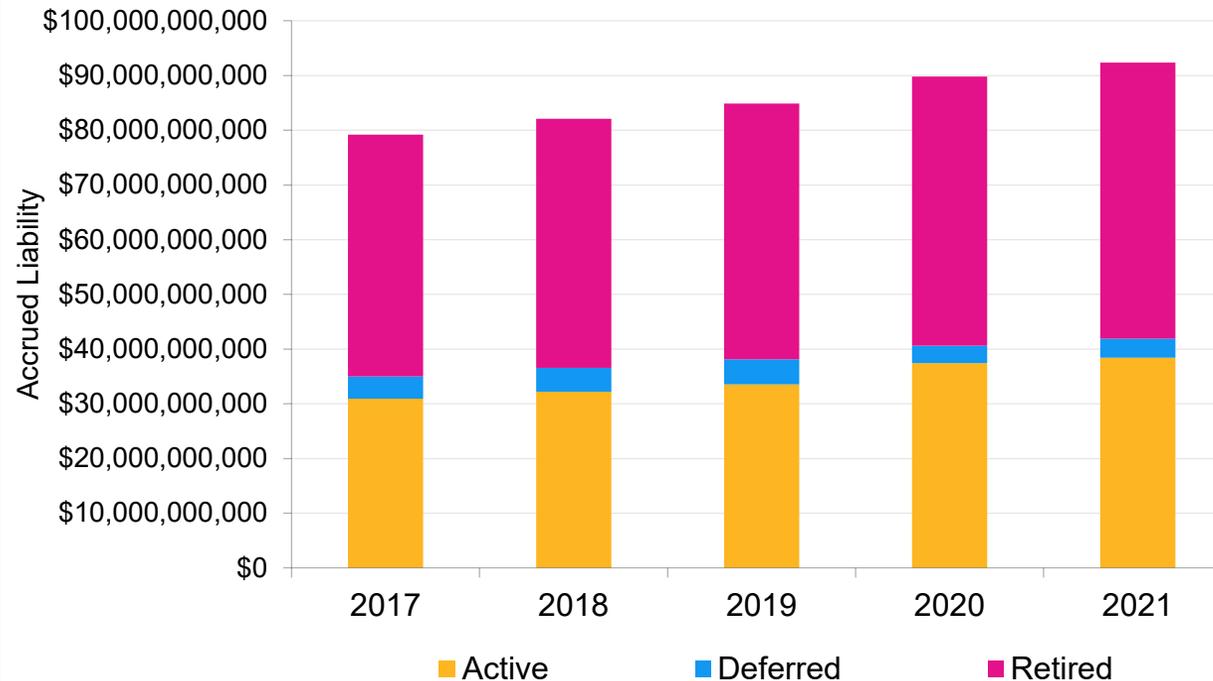
Membership Data  
 Asset Data  
 Benefit Provisions  
 Assumptions  
 Funding Methodology



### Results

Actuarial Value of Assets  
**Actuarial Accrued Liability**  
 Net Actuarial Gain or Loss  
 Funded Ratio  
 Employer Contributions  
 Benefit Enhancement  
 Additional Disclosures  
 Projections

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 5.

The AAL increased from \$89.8 billion to \$92.4 billion during 2021.

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 \$216 million lower than expected resulting primarily from lower salary increases and more observed deaths than expected for members in pay status.

Transition from the prior actuary to Buck resulted in an increase in AAL of \$150 million due to valuation programming modifications and differences in methodology.

# Valuation results

## AVA and AAL

### Inputs

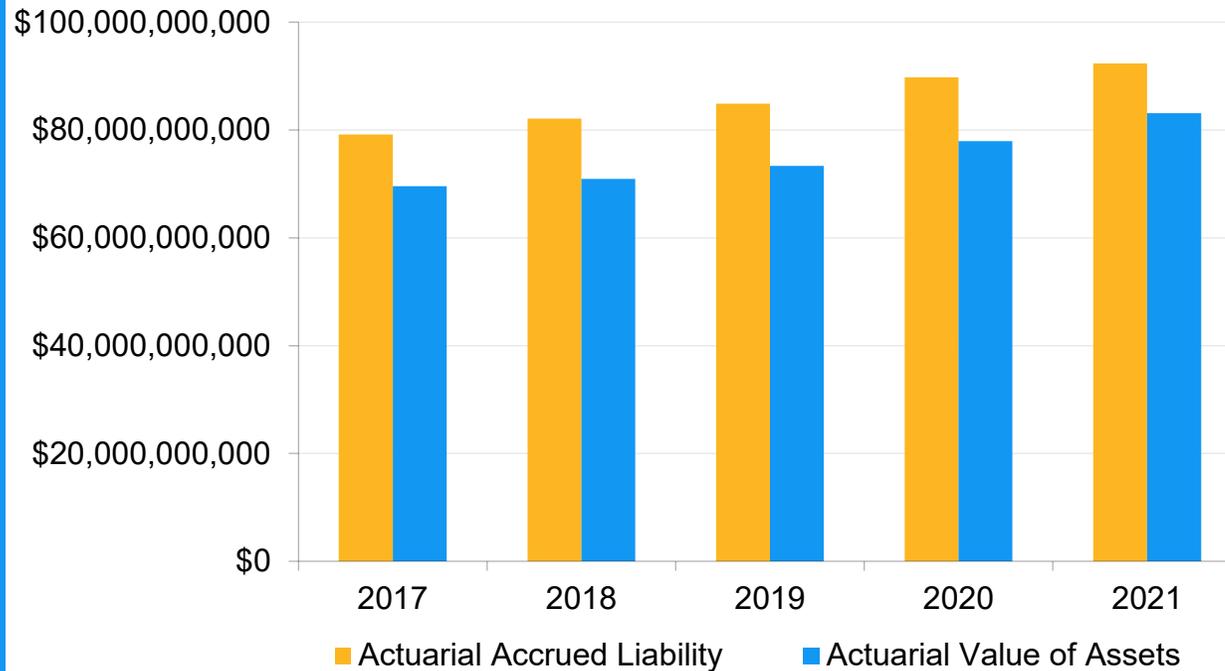
Membership Data  
Asset Data  
Benefit Provisions  
Assumptions  
Funding Methodology



### Results

Actuarial Value of Assets  
Actuarial Accrued Liability  
Net Actuarial Gain or Loss  
Funded Ratio  
Employer Contributions  
Benefit Enhancement  
Additional Disclosures  
Projections

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 4 and 5, 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 \$9.22 billion as of 12/31/2021 and is to be paid off over a 12-year period.

# Valuation results

## Net actuarial gain or loss

### Inputs

Membership Data  
Asset Data  
Benefit Provisions  
Assumptions  
Funding Methodology



### Results

Actuarial Value of Assets  
Actuarial Accrued Liability  
**Net Actuarial Gain or Loss**  
Funded Ratio  
Employer Contributions  
Benefit Enhancement  
Additional Disclosures  
Projections

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 12/31/2020	\$ 11,887
Normal cost and administrative expense during 2021	1,873
Reduction due to actual contributions during 2021	(3,399)
Interest on UAAL, normal cost, and contributions	785
Asset (gain) / loss	(2,062)
Actuarial accrued liability (gain) / loss	(66)
Impact of assumption changes	0
Impact of benefit changes	199
Unfunded actuarial accrued liability (UAAL) as of 12/31/2021	\$ 9,217

A detailed summary of the net actuarial gain or loss is provided in Section 5.

During 2021, the UAAL decreased primarily due to the asset gain of \$2,062 million.

Demographic experience decreased the UAAL by \$216 million.

Since the prior valuation, a transition from the prior actuary to Buck resulted in an increase in UAAL of \$150 million due to valuation programming modifications and differences in methodology.

Benefit changes (one-time supplement payable in October 2022) increased the UAAL by \$199 million.

# Valuation results

## Funded ratio

### Inputs

Membership Data  
Asset Data  
Benefit Provisions  
Assumptions  
Funding Methodology



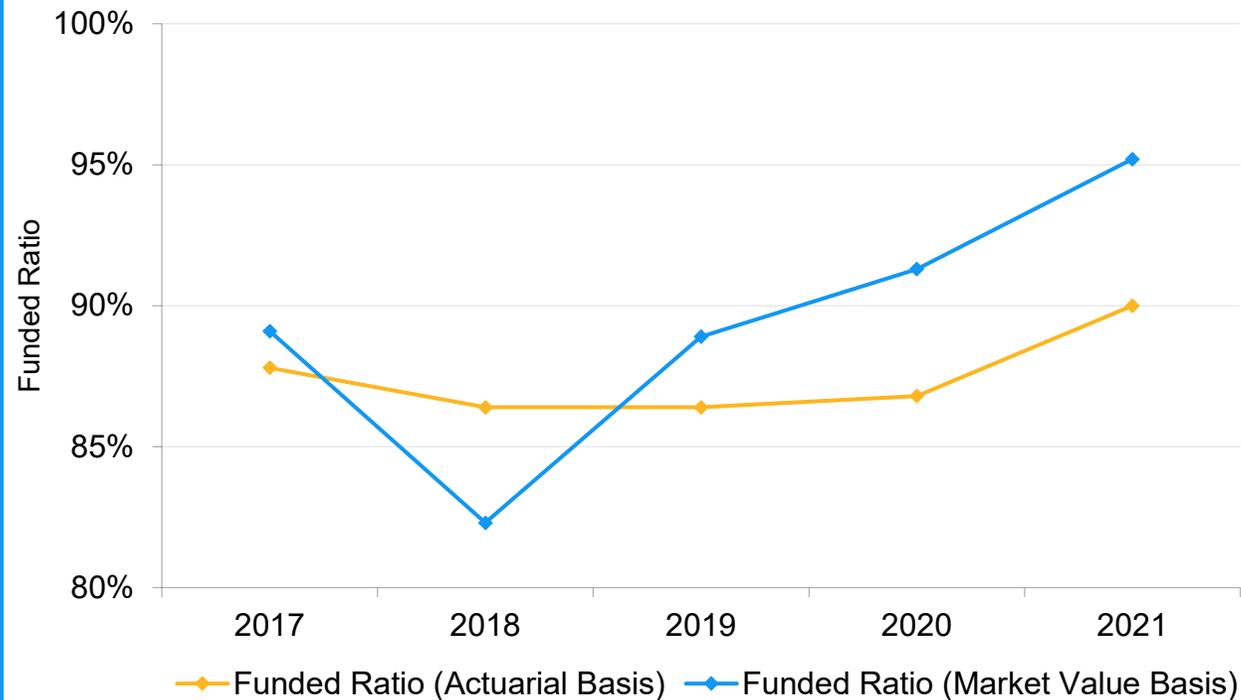
### Results

Actuarial Value of Assets  
Actuarial Accrued Liability  
Net Actuarial Gain or Loss

Funded Ratio

Employer Contributions  
Benefit Enhancement  
Additional Disclosures  
Projections

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 5.

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 increased from 86.8% as of December 31, 2020, to 90.0% as of December 31, 2021.

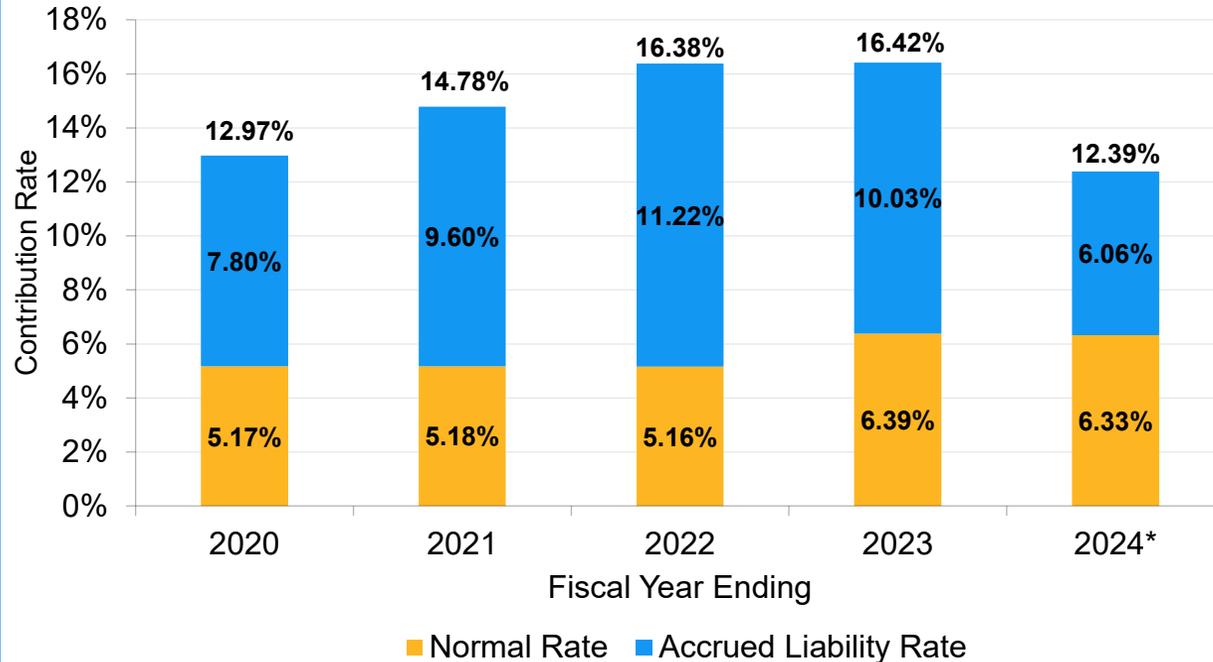
The increase was primarily due to asset gains.

# Valuation results

## Employer contributions: 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 6.

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: ECRSP

### Inputs

Membership Data  
Asset Data  
Benefit Provisions  
Assumptions  
Funding Methodology



### Results

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

Employer Contributions

Benefit Enhancement  
Additional Disclosures  
Projections

The Employer Contribution Rate Stabilization Policy (ECRSP) would result in a recommended contribution rate of 16.44% of payroll for fiscal year ending 2024.

- 14.18% is the actuarially determined employer contribution calculated in this most recent valuation prior to direct-rate smoothing.
- 12.39% is the actuarially determined employer contribution after direct-rate smoothing of the assumption and method changes.
- The minimum is 16.44%; the recommended appropriation from last year of 16.09% plus 0.35%\*
- The maximum is approximately 92.11%; the estimated actuarially determined employer contribution using a discount rate equal to the long-term treasury bond yield (1.90%).

\* The appropriated rate from last year is 16.09% after reversing the cost the Legislated One-Time Pension Supplement of 1.24% and the Legislated Unfunded Liability Solvency Reserve (ULSR) Contribution Pursuant to G.S. 143C-4-10(e) of 0.05%.

A detailed summary of the actuarially determined employer contribution rates is provided in Section 6.

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

## Employer contributions: history of rates and appropriations

### Inputs

Membership Data  
Asset Data  
Benefit Provisions  
Assumptions  
Funding Methodology



### Results

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

Employer Contributions  
Benefit Enhancement

Additional Disclosures  
Projections

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
12/31/2021	6/30/2024	6.33%	7.85%	(1.79%)	N/A	N/A	N/A	N/A	N/A
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%
12/31/2016	6/30/2019	4.48%	7.50%	0.00%	0.31%	0.00%	12.29%	12.29%	12.29%

\* 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 member's annual benefit amount, payable in October 2022. The change due to legislation for the contribution for fiscal year ending June 30, 2022 provided for a 2% one-time supplement payable in December 2021. The change due to legislation for the contribution for fiscal year ending June 30, 2019 provided for a 1% one-time supplement payable in October 2018.

A detailed summary of the actuarially determined employer contribution rates is provided in Section 6.

The appropriated rate for fiscal year ending 2023 is 17.38% of payroll.

The ADEC for fiscal year ending 2024 is 12.39% of payroll before applying the ECRSP and 16.44% of payroll after applying the ECRSP, without regard to any legislated changes to the rate.

In addition to calculating the ADEC, we calculated the increase in ADEC for a permanent one-time 1% COLA to be 0.41% of payroll and the increase in UAAL to be \$533 million.

We also calculated the increase in ADEC for a 0.01% increase in the Defined Benefit Formula to be 0.46% of payroll and the increase in UAAL to be \$509 million.

# Valuation results

## Employer contributions

### Inputs

Membership Data  
Asset Data  
Benefit Provisions  
Assumptions  
Funding Methodology



### Results

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

**Employer Contributions**

Benefit Enhancement  
Additional Disclosures  
Projections

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, 2023 Preliminary ADEC (based on December 31, 2020 valuation)	15.13%
Impact of Benefit Changes*	<u>1.29%</u>
Fiscal year ending June 30, 2023 Final ADEC	16.42%
Change Due to Anticipated Reduction in UAAL**	(1.91%)
Change Due to Demographic (Gain)/Loss	0.04%
Change Due to Investment (Gain)/Loss	(1.52%)
Change Due to Contributions Greater than ADEC	(0.11%)
Impact of Assumption Changes	0.00%
Impact of Benefit Changes	0.16%
Impact of Direct Rate Smoothing	0.60%
Reversal of one-time Benefit Costs	<u>(1.29%)</u>
Fiscal year ending June 30, 2024 Preliminary ADEC (based on December 31, 2021 valuation)	12.39%

\* Includes the Legislated One-Time Pension Supplement of 1.24% and the Legislated Unfunded Liability Solvency Reserve (ULSR) Contribution Pursuant to G.S. 143C-4-10(e) of 0.05%. The contribution from the ULSR serves to reduce the unfunded liability of TSERS. Therefore, it is reasonable to include this amount as part of a contribution determined in accordance with actuarial standards of practice.

\*\* 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.

A detailed summary of the actuarially determined employer contribution rates is provided in Section 6.

The change in rate due to investment gain is based on the actuarial value of assets return of 9.18%, which was greater than the 6.50% assumed return.

The 12-year amortization of the fresh start unfunded actuarial accrued liability as of December 31, 2009, is paid off as of July 1, 2023, which significantly reduces the ADEC before applying the ECRSP for fiscal year ending June 30, 2024.

# Valuation results

## Potential COLAs

### Inputs

Membership Data  
Asset Data  
Benefit Provisions  
Assumptions  
Funding Methodology



### Results

Actuarial Value of Assets  
Actuarial Accrued Liability  
Net Actuarial Gain or Loss  
Funded Ratio  
Employer Contributions  
Benefit Enhancement  
Additional Disclosures  
Projections

- The December 31, 2021, valuation indicates actuarial investment gains commensurate with the value of a Cost-of-Living Adjustment (COLA) effective July 1, 2023. However, the ECRSP would require an increase in the employer contribution rate to cover the cost of a COLA. Considerations follow this slide.
- Based on the methods and assumptions used for the projections discussed later in the presentation, we estimate that the value of a potential COLA effective July 1, 2024, may be commensurate with actuarial investment gains following the December 31, 2022, valuation under the following circumstances. Note, however, the ECRSP would require an increase in the employer contribution rate to cover the cost of a COLA.
  - If calendar year 2022 market value returns exceed negative 1.13% (or about negative \$1.0B for TSERS), the plan is estimated to have an actuarial investment gain (rather than a loss) for 2022 and a COLA effective July 1, 2024, could be considered.
  - If calendar year 2022 market value returns exceed 1.96% (or about \$1.7B for TSERS), the plan is estimated to have an actuarial investment gain (rather than a loss) for 2022 and such gain may be enough to consider providing a 1% COLA effective July 1, 2024.
    - Estimated actuarial investment gain of \$533.4M
    - Estimated cost of 1% COLA payable to retirees effective July 1, 2024 of \$533.4M.

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 6.

# Valuation results

## Potential COLA considerations

### Inputs

Membership Data  
Asset Data  
Benefit Provisions  
Assumptions  
Funding Methodology



### Results

Actuarial Value of Assets  
Actuarial Accrued Liability  
Net Actuarial Gain or Loss  
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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 2023
  - Permanent effective July 1, 2023
- 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 6.

# Valuation results

## Potential COLA considerations Actuarial investment gain to “spend”

The amount of actuarial investment gain for calendar 2021 is \$2,062,000,000. The maximum amount of COLA based on this amount is 3.86%, which may be limited by actual CPI for 2022. The increase in ECRSP rate would be 1.58% of pay, payable over 12 years.

### Impact on Employee Contribution Rate Stabilization Policy (ECRSP) Rate of Alternate Permanent One-Time-Cost-of -Living Increases

Amount	None	1.00%	2.00%	3.86%
<b>Increase in UAAL</b>	\$ -	\$ 533,364,000	\$ 1,066,728,000	\$ 2,058,785,000
<b>ECRSP Rate Effective 7/1/2023</b>				
Preliminary ECRSP Rate	16.44%	16.44%	16.44%	16.44%
Impact of COLA	<u>0.00%</u>	<u>0.41%</u>	<u>0.82%</u>	<u>1.58%</u>
ECRSP after impact of COLA	16.44%	16.86%	17.28%	18.02%

The cost of a 1% supplement cola is \$51.2 million, or 0.30% of pay, payable for one year.  
Considerations on the amount to be recommended are noted on the next slide.

A detailed summary of the cost of benefit enhancements is provided in Section 6.

**Inputs**

- Membership Data
- Asset Data
- Benefit Provisions
- Assumptions
- Funding Methodology

↓

**Results**

- Actuarial Value of Assets
- Actuarial Accrued Liability
- Net Actuarial Gain or Loss
- Funded Ratio
- Employer Contributions
- Benefit Enhancement**
- Additional Disclosures
- Projections

# Valuation results

## Potential COLA considerations Actuarial investment gain to “spend”

### Inputs

Membership Data  
Asset Data  
Benefit Provisions  
Assumptions  
Funding Methodology



### Results

Actuarial Value of Assets  
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Funded Ratio  
Employer Contributions  
Benefit Enhancement  
Additional Disclosures  
Projections

While recommending a 3.86% COLA is commensurate with the amount of investment gains recognized in 2021, the Board could consider the following reasons for recommending an amount less than the maximum:

- Providing COLAs under gain sharing works best when:
  - The amount of benefits granted is limited
  - The investment return assumed is lower than the expected return adjusted by the expected COLA payouts
- Is the investment gain permanent?
  - Each valuation is expected to generate an actuarial gain or loss on investments
  - Asset-Liability study performed by DST provides a lower than 50% chance of funds achieving 6.50% return over both 10-year and 30-year time horizons
  - Current gain may be needed to offset future losses to keep contributions from rising more than anticipated
- Potential lower investment return
  - Board may decide to reduce investment return assumption further the next time it is revisited, based on Asset-Liability study or other inputs
  - If so, system’s liability increase could significantly exceed actuarial investment gains recognized in current valuation
- Employer contributions accounted for about 68% of total contributions over the past 5 years
- The unfunded liability of TSERS remains significant at \$9.2 billion
- YTD 2022 investment returns have been far below the assumed return
- Any recommendation should come with the understanding that the General Assembly would need to appropriate the related cost through its budget process

A detailed summary of the cost of benefit enhancements is provided in Section 6.

# Valuation results

## Additional disclosures

### Inputs

Membership Data  
Asset Data  
Benefit Provisions  
Assumptions  
Funding Methodology



### Results

Actuarial Value of Assets  
Actuarial Accrued Liability  
Net Actuarial Gain or Loss  
Funded Ratio  
Employer Contributions  
Benefit Enhancement  
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	1.90%	4.20%	6.50%	8.80%	11.10%
Market Value of Assets	\$ 87.97	\$ 87.97	\$ 87.97	\$ 87.97	\$ 87.97
Actuarial Accrued Liability	\$ 170.07	\$ 122.14	\$ 92.36	\$ 73.15	\$ 60.13
Unfunded Accrued Liability (AAL)	\$ 82.11	\$ 34.18	\$ 4.39	\$ (14.81)	\$ (27.83)
Funded Ratio	51.7%	72.0%	95.2%	120.2%	146.3%
20-Year Amortization of UAL	\$ 5.07	\$ 2.67	\$ 0.42	N/A	N/A
(as % of general state revenue)	12.3%	6.5%	1.0%	N/A	N/A

\*Numbers may not add due to rounding.

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

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 1.90% as of December 31, 2021.

The difference between the UAAL measured at 6.50% and 1.90% is \$77.7 billion at December 31, 2021.

# Valuation results

## Additional disclosures

### Inputs

Membership Data  
Asset Data  
Benefit Provisions  
Assumptions  
Funding Methodology



### Results

Actuarial Value of Assets  
Actuarial Accrued Liability  
Net Actuarial Gain or Loss  
Funded Ratio  
Employer Contributions  
Benefit Enhancement  
**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 in 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 F.

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

The lower bound of 1.90% falls below the 5th percentile of estimated future 30-year returns.

In other words, there is less than a 5% chance of seeing a 30-year return of 1.90% or lower based on the study performed in 2022.

# Valuation results

## Projections

### Inputs

Membership Data

Asset Data

Benefit Provisions

Assumptions

Funding Methodology



### Results

Actuarial Value of Assets

Actuarial Accrued Liability

Net Actuarial Gain or Loss

Funded Ratio

Employer Contributions

Benefit Enhancement

Additional Disclosures

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, 2021 valuation results as assumptions.
- Key Projection Assumptions
  - Valuation interest rate of 6.50% for all years in conjunction with direct rate smoothing of the employer contribution rate 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 D of the valuation report. 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 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) rate 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.
- 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 2021. The second alternate deterministic projection is based on the same assumptions as the baseline deterministic projection except that it assumes a -6.50% asset return for calendar year 2021.

A detailed summary of the deterministic projections is provided in Section 9.

# Valuation results

## Projected Contribution Rates

**Inputs**

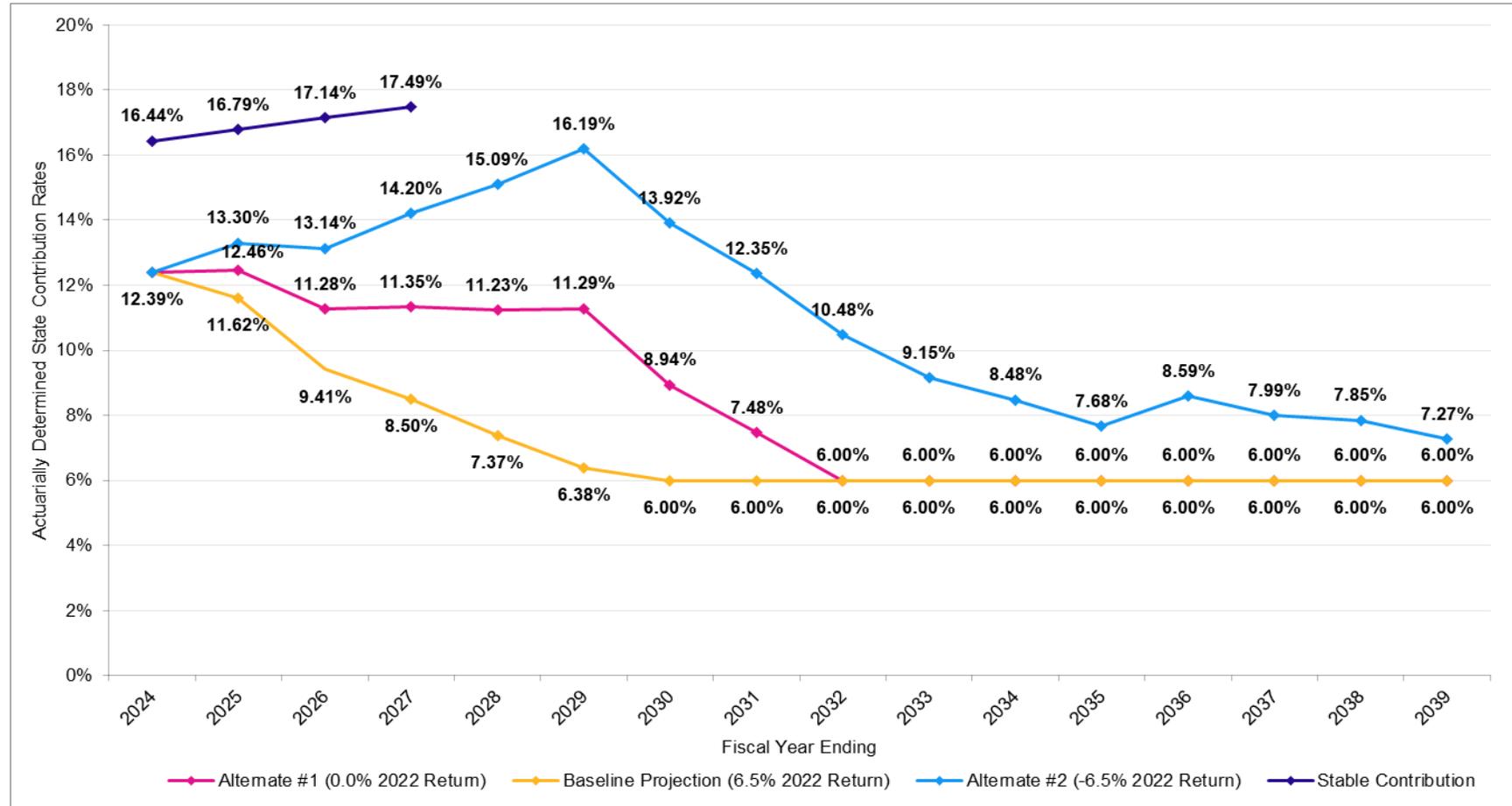
- Membership Data
- Asset Data
- Benefit Provisions
- Assumptions
- Funding Methodology

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**Results**

- Actuarial Value of Assets
- Actuarial Accrued Liability
- Net Actuarial Gain or Loss
- Funded Ratio
- Employer Contributions
- Benefit Enhancement
- Additional Disclosures

Projections



A detailed summary of the deterministic projections is provided in Section 9.

# Valuation results

## Projected Funded Ratio

**Inputs**

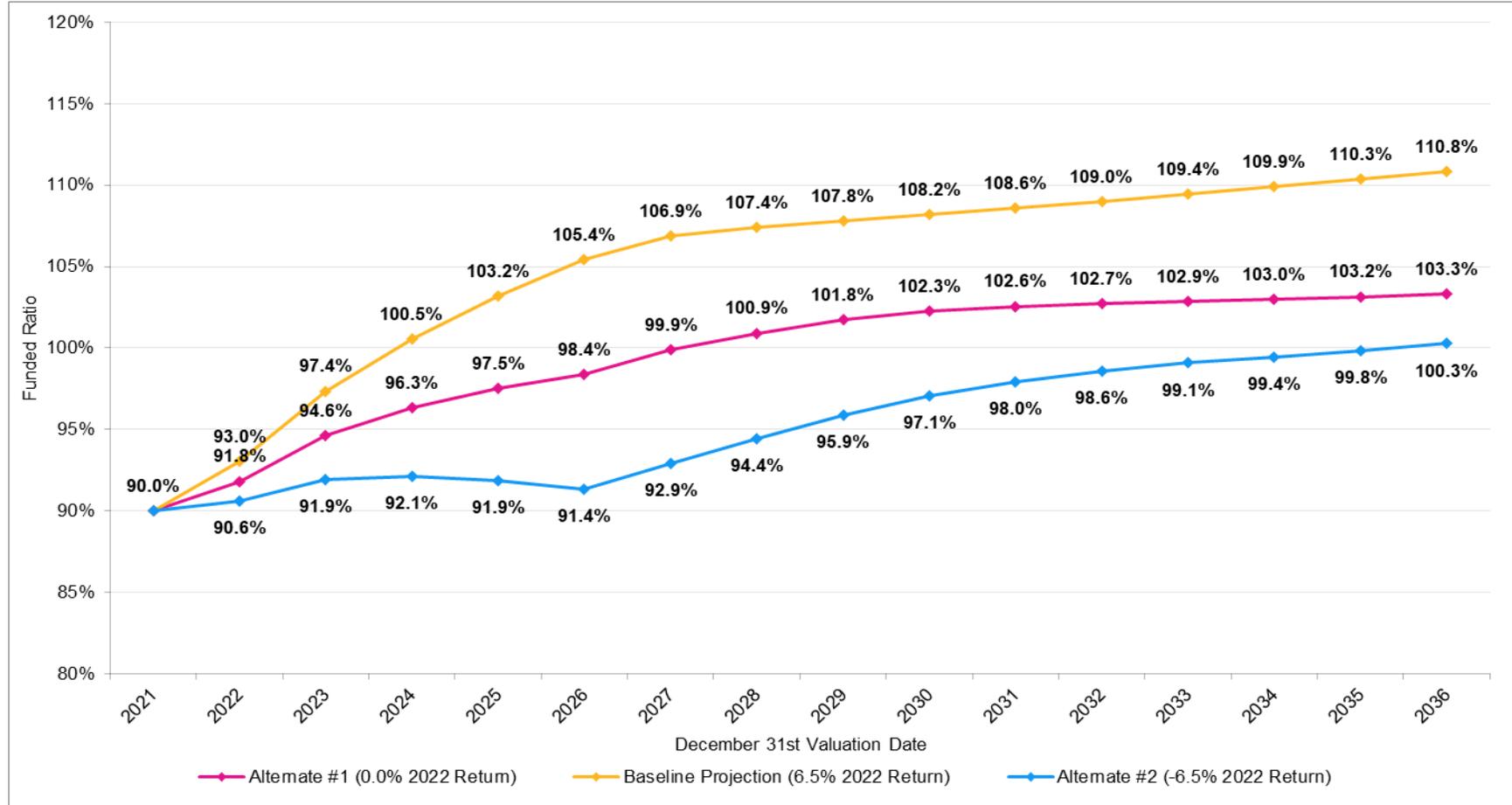
- Membership Data
- Asset Data
- Benefit Provisions
- Assumptions
- Funding Methodology

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**Results**

- Actuarial Value of Assets
- Actuarial Accrued Liability
- Net Actuarial Gain or Loss
- Funded Ratio
- Employer Contributions
- Benefit Enhancement
- Additional Disclosures

Projections



A detailed summary of the deterministic projections is provided in Section 9.

# Valuation results

## Projections

### Inputs

Membership Data  
Asset Data  
Benefit Provisions  
Assumptions  
Funding Methodology



### Results

Actuarial Value of Assets  
Actuarial Accrued Liability  
Net Actuarial Gain or Loss  
Funded Ratio  
Employer Contributions  
Benefit Enhancement  
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 2022.

A detailed summary of the deterministic projections is provided in Section 9.

# Valuation results

## Projected Contribution Rates

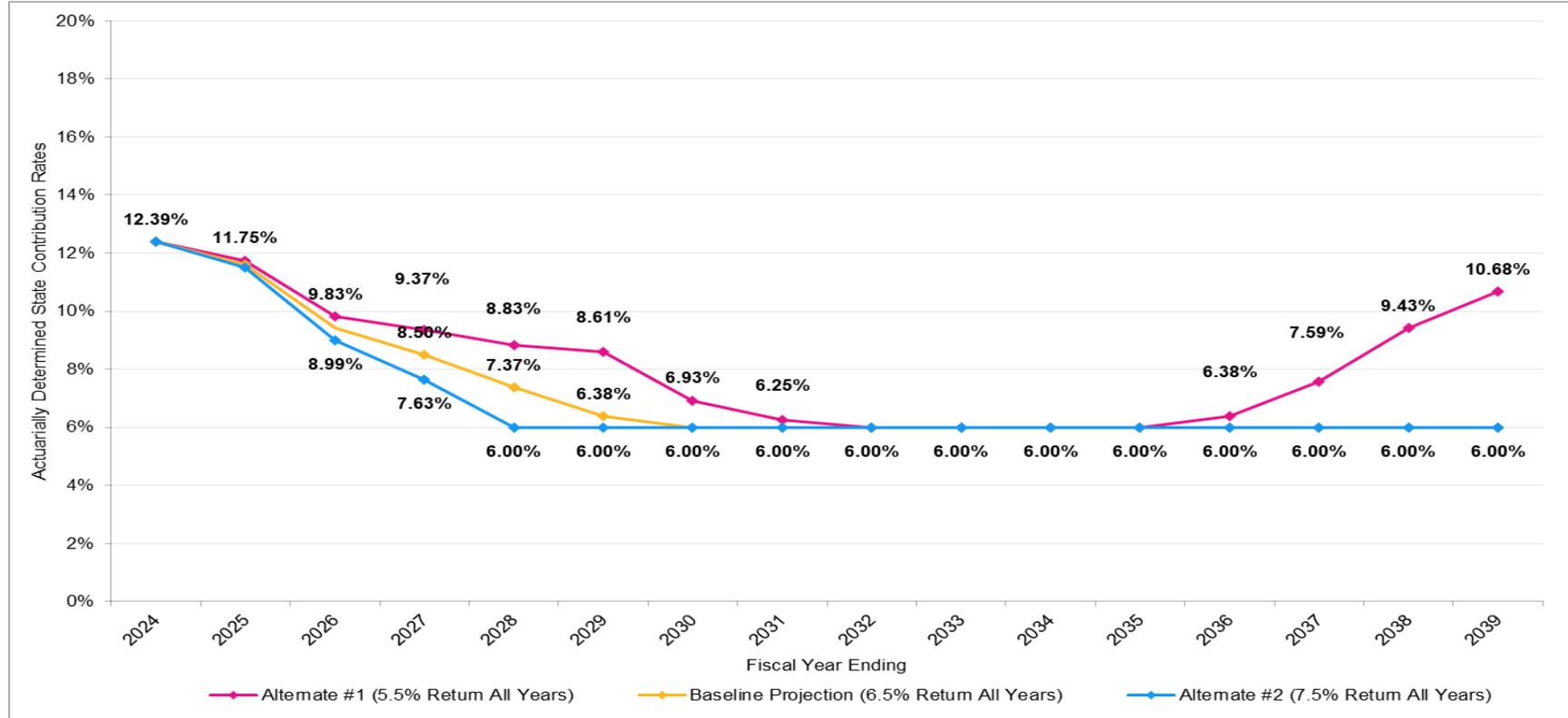
**Inputs**

- Membership Data
- Asset Data
- Benefit Provisions
- Assumptions
- Funding Methodology

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**Results**

- Actuarial Value of Assets
- Actuarial Accrued Liability
- Net Actuarial Gain or Loss
- Funded Ratio
- Employer Contributions
- Benefit Enhancement
- Additional Disclosures
- Projections



Projected contribution rates Alternate Projection #1 assumes 5.50% asset returns every year starting in 2022 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.

A detailed summary of the deterministic projections is provided in Section 9.

# Valuation results

## Projected Funded Ratio

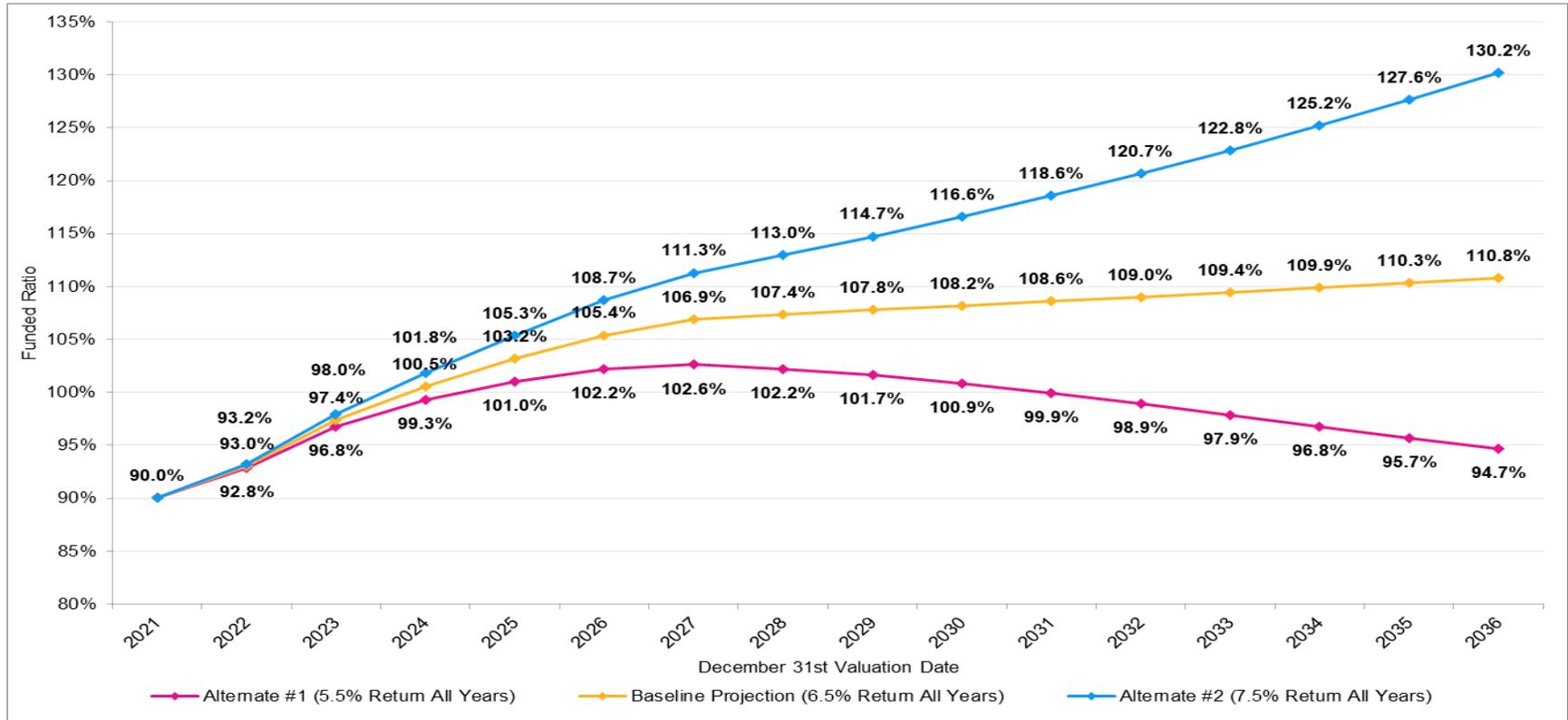
**Inputs**

- Membership Data
- Asset Data
- Benefit Provisions
- Assumptions
- Funding Methodology

↓

**Results**

- Actuarial Value of Assets
- Actuarial Accrued Liability
- Net Actuarial Gain or Loss
- Funded Ratio
- Employer Contributions
- Benefit Enhancement
- Additional Disclosures
- Projections



Projected contribution rates Alternate Projection #1 assumes 5.50% asset returns every year starting in 2022 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.

A detailed summary of the deterministic projections is provided in Section 9.

# Key takeaways

- Key results of the December 31, 2021 valuation were:
  - Market value returns of 9.68% during calendar year 2021 compared to 6.50% assumed
  - 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
  - 12-year amortization of the fresh start unfunded actuarial accrued liability as of December 31, 2009 with current annual payments of \$319.1 million will be paid off as of June 30, 2023, which significantly reduces the actuarially determined employer contribution rate before applying the ECRSP
  - Recent legislation signed into law since the prior valuation
    - One-time supplement payment for TSERS payees of 4% of their annual retirement allowance, payable in October 2022

# Key takeaways (continued)

- When compared to the December 31, 2020 baseline projections, the above resulted in:
  - A higher funded ratio as of December 31, 2021 (90.0% in the valuation compared to 89.7% in the baseline projection)
  - A lower actuarially determined employer contribution rate before applying the ECRSP for fiscal year ending June 30, 2024 (12.39% in the valuation compared to 14.42% in the baseline projection)

# 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

# ASOP 27/35 disclosures

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

# ASOP 56 disclosure

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. 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.

# 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.

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





# **Teachers' and State Employees' Retirement System of North Carolina**

Report on the Seventy-Ninth Actuarial Valuation  
Prepared as of December 31, 2021

October 2022



110 West Berry Street  
Suite 1300  
Fort Wayne, IN 46802

October 10, 2022

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Teachers' and State Employees'  
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Raleigh, NC 27604

Members of the Board:

We submit herewith our report on the seventy-ninth 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, 2021. 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. In addition, the report provides information that the Office of the State Controller (OSC) requires for its Annual Comprehensive Financial Report, and it summarizes census data. Use of this report for any other purposes or by anyone other than OSC and its auditors, or North Carolina Retirement Systems Division and 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 Global, LLC (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 the Retirement Systems Division 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 and the requirements of Governmental Accounting Standards Board (GASB) Statement No. 67. 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, 2021, 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 other than the investment return assumption (i.e., the valuation interest rate) 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,

Buck Global, LLC (Buck)



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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, 2021, 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, 2022, RSD paid over \$7.1 billion in pensions to more than 330,000 retirees. And as of June 30, 2022, RSD's defined benefit plan assets were valued at over \$110 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 \$88 billion in assets and over 740,000 members as of December 31, 2021, 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, 2021, presents the results of the seventy-ninth 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 Appendix A.

# 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 9 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 F-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, 2021 valuation as compared to the December 31, 2020 valuation were:

- Market value returns of 9.68% during calendar year 2021 compared to 6.50% assumed
- Continuation of direct-rate smoothing of the change in the employer contribution rate due to the changes in assumptions and methods over a 5-year period beginning with the December 31, 2020 valuation
- Recent legislation signed into law since the prior valuation
  - One-time supplement payment for TSERS payees of 4% of their annual retirement allowance, payable in October 2022

When compared to the December 31, 2020 projections, the above resulted in:

- A slightly higher funded ratio as of December 31, 2021 (90.0% in the valuation compared to 89.7% in the baseline projection)
- A lower actuarially determined employer contribution rate prior to applying the Employer Contribution Rate Stabilization Policy (ECRSP) for fiscal year ending June 30, 2024 (12.39% in the valuation compared to 14.42% 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.

More details can be found later in this report. We encourage readers to start with Sections 1 and 2 and refer to other sections for additional details as needed.

This report, prepared as of December 31, 2021, 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, 2021, presents the results of the seventy-ninth annual valuation of the system. The principal results of the valuation and a comparison with the preceding year's results are summarized below.

## 1.1 Summary of Principal Results

Valuation results as of	12/31/2021	12/31/2020
Active Members		
Number	300,310	302,771
Reported Compensation	\$15,312,224,584	\$15,287,665,011
Valuation Compensation*	\$16,632,724,779	\$16,446,271,542
Retired Members and Survivors of Deceased Members Currently Receiving Benefits		
Number	238,652	233,751
Annual Allowances	\$ 5,044,817,043	\$ 4,927,686,580
Assets		
Actuarial Value (AVA)	\$83,139,458,098	\$77,922,070,039
Market Value (MVA)	\$87,966,352,518	\$81,969,425,086
Actuarial Accrued Liability (AAL)	\$92,356,225,906	\$89,809,074,074
Unfunded Accrued Liability (AAL-AVA)	\$ 9,216,767,808	\$11,887,004,035
Funded Ratio (AVA/AAL)**	90.0%	86.8%
Results for Fiscal Year Ending	6/30/2024	6/30/2023
Actuarially Determined Employer Contribution (ADEC), as a percentage of payroll		
Normal Cost	6.33%	6.39%
Accrued Liability	<u>7.85%</u>	<u>11.13%</u>
Total Preliminary ADEC	14.18%	17.52%
Total Based on Direct Rate Smoothing	12.39%	15.13%
Impact of Benefit Changes***	<u>N/A</u>	<u>1.29%</u>
ADEC Prior to Application of Funding Policy	N/A	16.42%
Board of Trustees Recommended Contribution under the Employer Contribution Rate		
Stabilization Policy (ECRSP)	16.44%	17.38%
Required Employer Contribution NCGS 135-8(d)	16.44%	17.38%
Appropriations Act for Fiscal Year Ending	6/30/2024	6/30/2023
Employer Contribution Rate as a percentage of payroll		
Normal Cost	6.33%	6.39%
Accrued Liability	<u>N/A</u>	<u>10.99%</u>
Total	N/A	17.38%

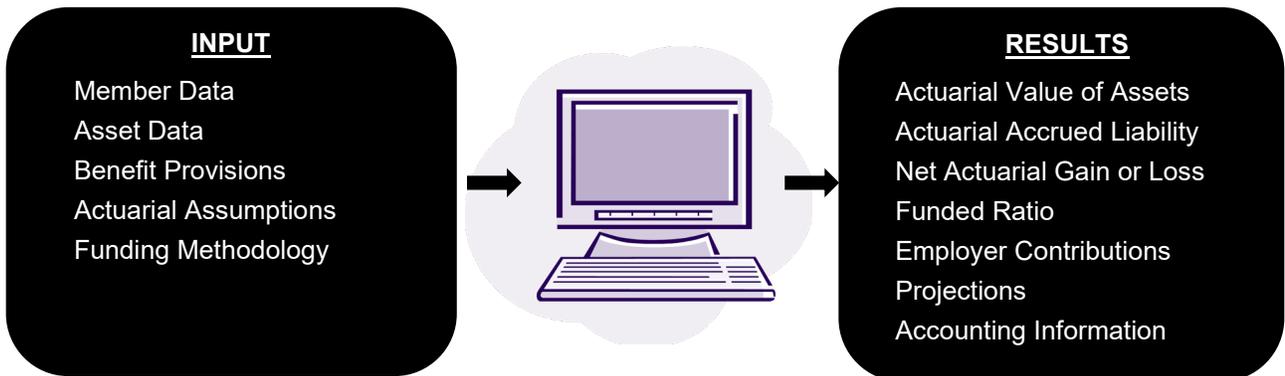
\* Reported compensation annualized for new hires and projected for valuation purposes.

\*\* The Funded Ratio on a Market Value of Assets basis is 95.2% at December 31, 2021

\*\*\* FY 2023 rate includes the Legislated One-Time Pension Supplement of 1.24% and the Legislated Unfunded Liability Solvency Reserve (ULSR) Contribution Pursuant to G.S. 143C-4-10(e) of 0.05%. The contribution from the ULSR serves to reduce the unfunded liability of TSERS. Therefore, it is reasonable to include this amount as part of a contribution determined in accordance with actuarial standards of practice.

## Section 2: Valuation Process

The following diagram summarizes the inputs and results of the actuarial valuation process.



A more detailed description of the valuation process is provided in Appendix A.

### Valuation Input: Membership Data

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	12/31/2021	12/31/2020
Active members	300,310	302,771
Members currently receiving Disability Income Plan benefits	4,961	5,410
Terminated members and survivors of deceased members entitled to benefits but not yet receiving benefits	198,642	185,465
Retired members and survivors of deceased members currently receiving benefits	<u>238,652</u>	<u>233,751</u>
Total	742,565	727,397

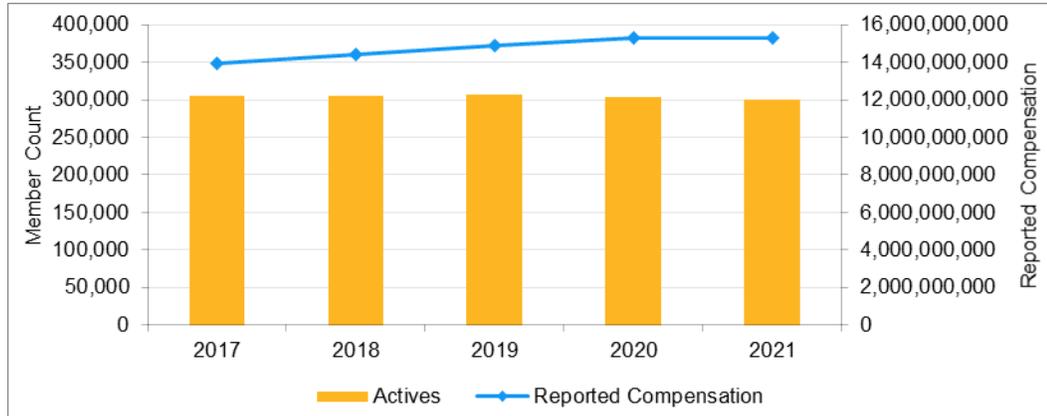
**Commentary:** The number of active members decreased 0.8% from the previous valuation date. The number of retired members and survivors of deceased members currently receiving benefits increased by 2.1% from the previous valuation date. The increase in retiree population is consistent with expectations.

## Section 2: Valuation Process (continued)

### Valuation Input: Membership Data (continued)

**Graph 1: Active Members**

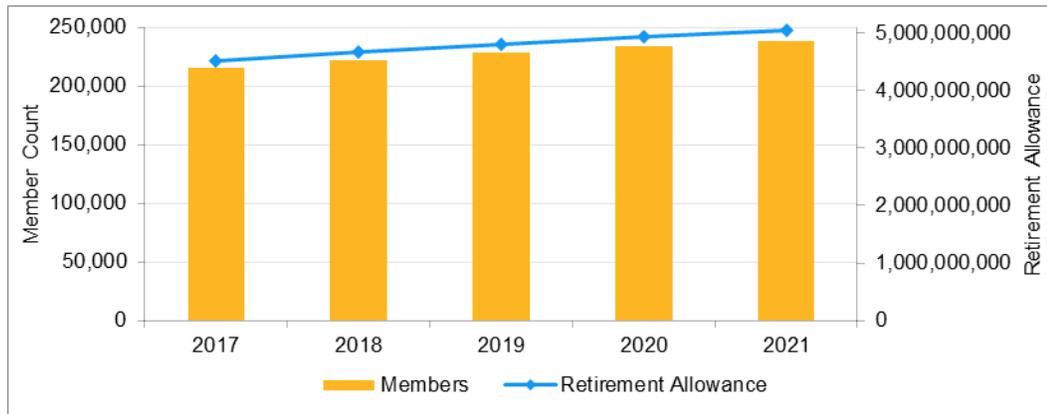
The graph below provides a history of the number of active members and reported compensation over the past five years.



**Commentary:** Reported compensation has increased by 0.2% and the increase has averaged 2.4% over the past four years. Covered payroll was expected to increase annually by 3.50% for valuations prior to December 31, 2020 and 3.25% annually beginning with the December 31, 2020 valuation. Payroll that is not increasing as fast as we assume results in less benefits accruing than we anticipate, but also fewer contributions supporting the system.

**Graph 2: Retired Members and Survivors of Deceased Members**

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.



**Commentary:** 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.

A detailed summary of the membership data used in this valuation is provided in Section 3 and Appendix B of this report.

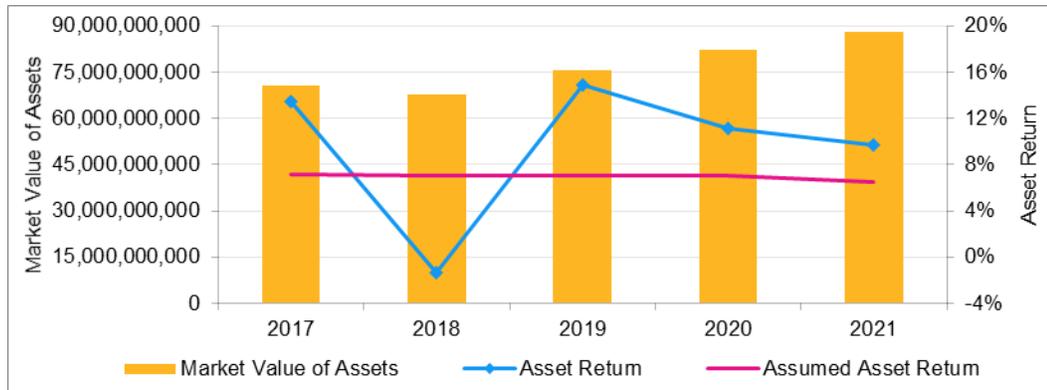
## Section 2: Valuation Process (continued)

### Valuation Input: Asset Data

TSERS assets are held in trust and are invested for the exclusive benefit of plan members. The Market Value of Assets is \$88.0 billion as of December 31, 2021 and was \$82.0 billion as of December 31, 2020. The investment return for the market value of assets for calendar year 2021 was 9.68%.

#### Graph 3: Market Value of Assets and Asset Returns

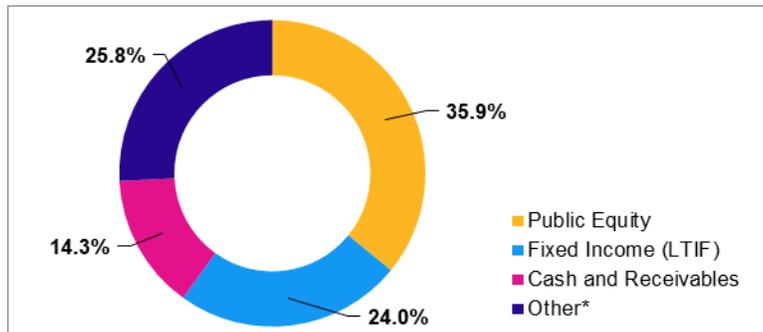
The graph below provides a history of the market value of assets and asset returns over the past five years.



**Commentary:** Market value returns during 2021 were greater than the 6.50% assumed rate of return, resulting in lower required contributions and a higher funded ratio than anticipated in the December 31, 2020 baseline projections presented in the December 31, 2020 actuarial report.

#### Graph 4: Allocation of Investments by Category

The graph below provides the breakdown of the market value of assets at December 31, 2021 by asset category.



\* Real Estate, Alternatives, Inflation and Credit

**Commentary:** 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 the market value of assets is provided in Section 4 of this report.

## Section 2: Valuation Process (continued)

### Valuation Input: Benefit Provisions

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

There were no significant changes in benefit provisions from the prior year's valuation, other than a one-time benefit supplement payment equal to 4% of the member's annual benefit amount for the fiscal year ending June 30, 2023, payable in October 2022. 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.

Highlights of the benefit provisions are described below.

- An unreduced retirement allowance is payable to non-law enforcement members who retire from service:
  - after attaining age 65 and five years of creditable service.
  - after attaining age 60 and 25 years of creditable service; or
  - after attaining 30 years of creditable service
- An unreduced retirement allowance is payable to law enforcement members who retire from service:
  - after attaining age 55 and five years of creditable service; or
  - after attaining 30 years of creditable service
- The unreduced retirement allowance is equal to 1.82% of a member's average final compensation multiplied by the number of years of creditable service. Average final compensation is based on the four highest consecutive years of compensation.
- A reduced retirement allowance is payable to non-law enforcement members who retire from service:
  - after attaining age 60 and five years of membership service; or
  - after attaining age 50 and 20 years of creditable service.
- A reduced retirement allowance is payable to law enforcement members who retire from service after attaining age 50 and 15 years of creditable service or after attaining 25 years of creditable service (15 as an officer).
- Ancillary benefits are also payable upon the death or disability of a member.
- TSERS does not provide for automatic cost-of-living increases. Instead, increases may be provided if certain financial conditions are met. More details on cost-of-living increases are provided in Graph 5.

**Commentary:** 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 the actuarially determined employer contribution, benefit cuts have not been needed in North Carolina as they have been in most other states. Instead, we have seen a modest expansion of benefits in recent years based on sound plan design. 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.

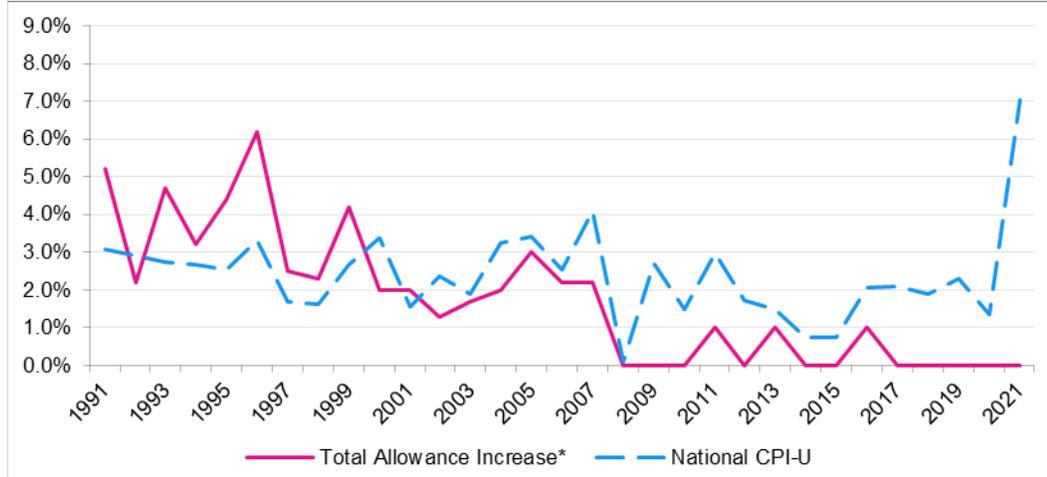
As noted previously, cost-of-living increases are periodically considered by the Board of Trustees to the extent that certain financial conditions are met. Specifically, benefit allowance increases are generally considered when the trust experiences sufficient investment gains to cover the additional 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.

## Section 2: Valuation Process (continued)

### Valuation Input: Benefit Provisions (continued)

**Graph 5: Cost-of-Living Increase and CPI-U History**

The graph below provides a 30-year history of allowance increases for TSERS and the national CPI-U.



\* Allowance increases are effective at July 1 the following year.

**Commentary** Prior to 2000, asset returns generally exceeded expectations and allowance increases exceeded the cost of living. Subsequently, asset returns on average have been lower than expected leading to lower allowance increases. Graph shows only permanent increases to the retirement allowance and not one-time supplements that have been granted.

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

## **Section 2: Valuation Process (continued)**

### **Valuation Input: 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, 2021 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.

## Section 2: Valuation Process (continued)

### Valuation Input: Funding Methodology

The Funding Methodology is the payment plan for TSERS and is composed of the following three components:

- 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
  - Develops normal costs that stay level as a percent of payroll
- Asset Valuation Methods smooth or average the market value returns over time to alleviate contribution volatility that results from market returns. The Board of Trustees has adopted the following:
  - Asset returns in excess of or less than the expected return on market value of assets reflected over a five-year period
  - Asset corridor: not greater than 120% of market value and not less than 80% of market value
- 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). The Board of Trustees has adopted the following:
  - Payment level: the payment is determined as a level dollar amount, similar to 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 year experience.

These elements form the traditional components of the actuarially determined employer contribution. In addition to the policies above, Direct-Rate Smoothing and ECRSP policies are also used in the determination of the final employer contribution rate. The Direct-Rate Smoothing and ECRSP policies are discussed in more length in Section 6.

**Commentary:** 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 the actuarial assumptions and methods is provided in Appendix D of this report.

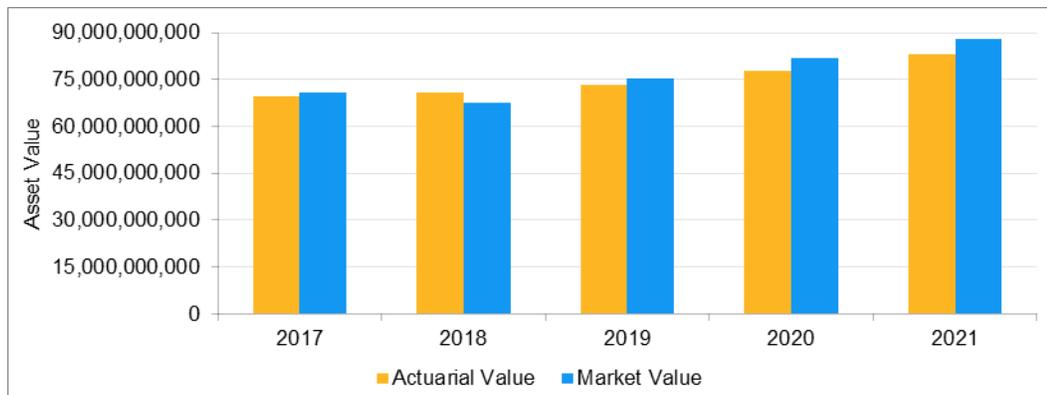
## Section 2: Valuation Process (continued)

### Valuation Results: Actuarial Value of Assets

In order to reduce the volatility that investment gains and losses can have on 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 Actuarial Value of Assets is \$83.1 billion as of December 31, 2021 and \$77.9 billion as of December 31, 2020.

#### Graph 6: Actuarial Value and Market Value of Assets

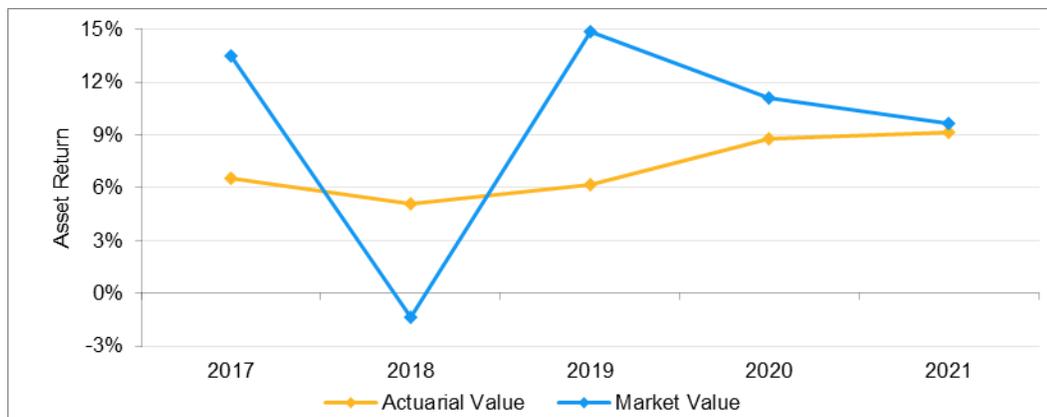
The graph below provides a history of the market value and actuarial value of assets over the past five years.



**Commentary:** The market value of assets is greater than the actuarial value of assets, which is used to determine employer contributions. This indicates that overall, there are unrecognized asset gains to be recognized in future valuations.

#### Graph 7: Asset Returns

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



**Commentary:** The investment return for the market value of assets for calendar year 2021 was 9.68%. The actuarial value of assets smooths investment gains and losses. Higher than expected market returns, in 2019, 2020, and 2021, resulted in an actuarial value of asset return for calendar year 2021 of 9.18% and a recognized actuarial asset gain of \$2.1 billion during 2021. Even after recognizing this gain, the assets at actuarial value were \$9.2 billion less than the actuarial accrued liability as of December 31, 2021.

A detailed summary of the Actuarial Value of Assets is provided in Section 4 of this report.

## Section 2: Valuation Process (continued)

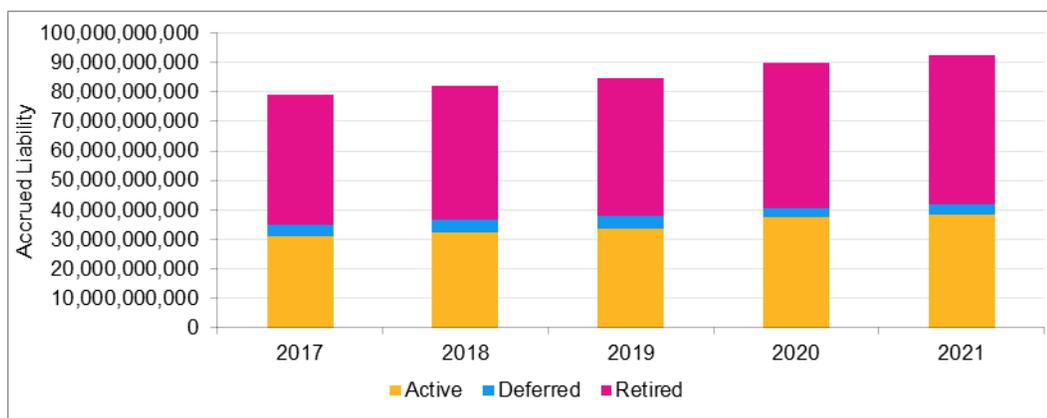
### Valuation Results: Actuarial Accrued Liability

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 (PVFB) of TSERS. The PVFB is an estimate of the current value of the benefits promised to all members as of a valuation date.

Once the PVFB is developed, an actuarial cost method is used to allocate the PVFB. Under the actuarial cost method, the PVFB is allocated to past, current and future service, respectively known as the actuarial accrued liability (AAL), normal cost (NC) and present value of future normal costs (PVFNC). The AAL is also referred to as the amount of money TSERS should ideally have in the trust. The NC is also referred to as the cost of benefits accruing during the year.

#### Graph 8: Actuarial Accrued Liability

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



**Commentary:** The AAL increased from \$89.8 billion to \$92.4 billion during 2021. 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 prior to legislation changes was \$216 million lower than expected, resulting primarily from demographic gains attributable to lower than expected salary increases for continuing active members and more observed deaths than assumed for members in pay status. Since the prior valuation, a transition from the prior actuarial firm to Buck resulted in an increase in AAL of \$150 million due to valuation programming modifications and differences in methodology. Finally, the enactment of the one-time supplement to be paid in October 2022 increased the AAL as of December 31, 2021 by \$199 million.

A detailed summary of the AAL is provided in Section 5 of this report.

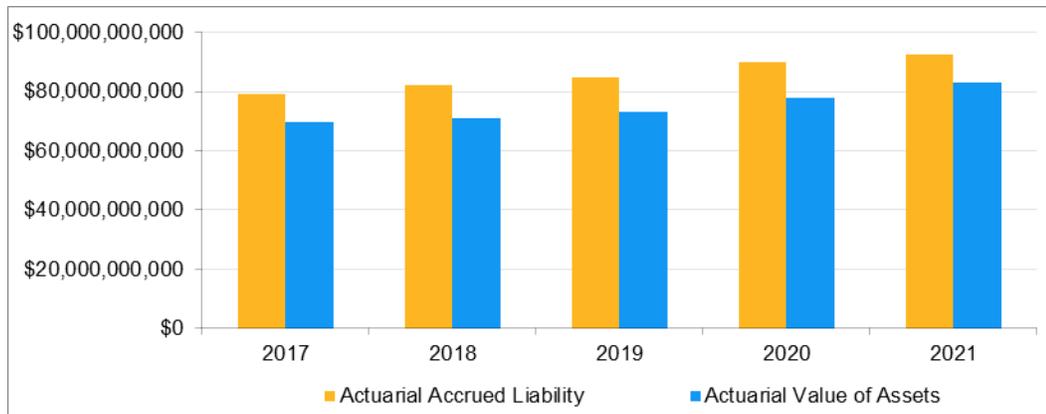
## Section 2: Valuation Process (continued)

### Valuation Results: 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.

#### Graph 9: Actuarial Accrued Liability and Actuarial Value of Assets

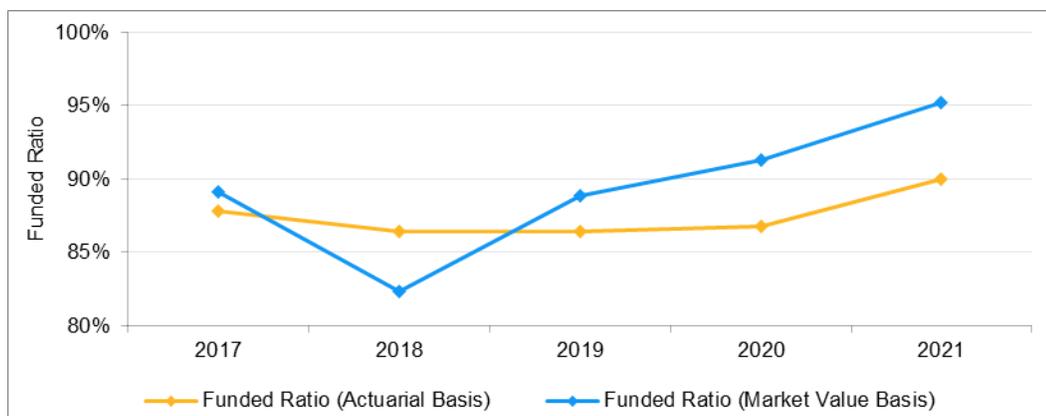
The graph below provides a history of the actuarial accrued liability compared to the actuarial value of assets over the past five years.



**Commentary:** 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.

#### Graph 10: Funded Ratios

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



**Commentary:** The ratio of assets to liabilities shows the health of the plan on an accrued basis. The funded ratio on an actuarial basis increased from 86.8% at December 31, 2020 to 90.0% at December 31, 2021.

## Section 2: Valuation Process (continued)

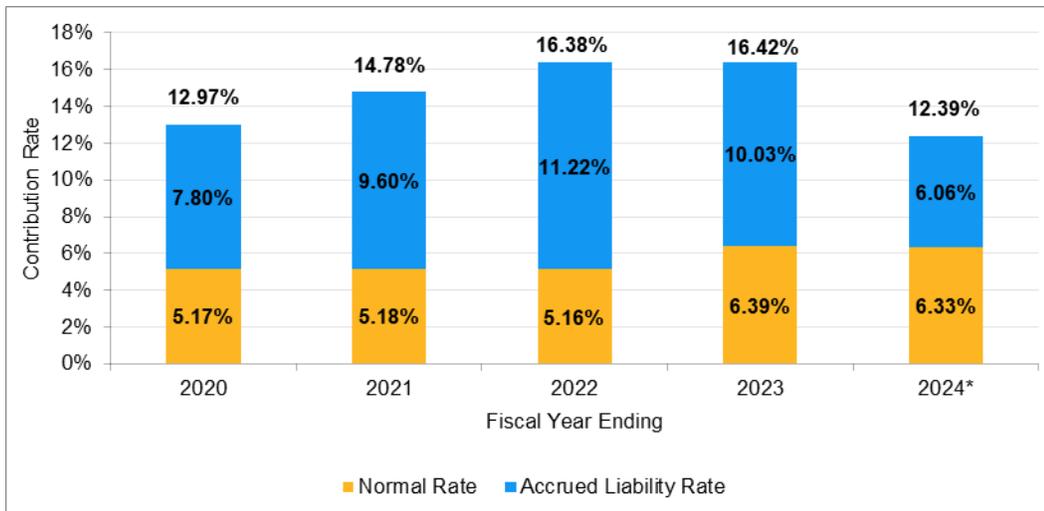
### Valuation Results: Employer Contributions

The North Carolina General Statutes provide that the contributions of employers shall consist of a normal contribution and an accrued liability contribution. G.S. 135-8(g) allows for the Board of Trustees of TSERS to make changes to accounting methods and procedures that, in its opinion, are in the interest of sound and proper administration of TSERS.

The December 31, 2020 valuation suggested that the preliminary total employer contribution rate be set at 15.13% of payroll for the fiscal year ending June 30, 2023. This rate was increased by 1.29% as a result of the Legislated One-Time Pension Supplement of 1.24% and the Legislated Unfunded Liability Solvency Reserve (ULSR) Contribution Pursuant to G.S. 143C-4-10(e) of 0.05%, so that the total ADEC rate prior to application of the ECRSP was 16.42%. As a result of this December 31, 2021 valuation, the preliminary actuarially determined employer contribution rate is 12.39% of payroll for the fiscal year ending June 30, 2024, subject to the impact of any future legislative changes effective during that fiscal year and application of the ECRSP.

#### Graph 11: 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

**Commentary:** 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 6 of this report.

## Section 2: Valuation Process (continued)

### 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, 2021 valuation results and assumptions.

#### Key Projection Assumptions:

- Valuation interest rate of 6.50% for all years, with direct-rate smoothing of the employer contribution rates over a five-year period beginning July 1, 2022.
- 6.50% investment return on market value of assets
- Actuarial assumptions and methods as described in Appendix D. 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 prior to application of the ECRSP is contributed for fiscal years ending 2028 and beyond
- 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 adopted by the Board of Trustees on April 29, 2021 for FYE 2023 through 2027 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) rate 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.

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 2022. The second alternate deterministic projection is based on the same assumptions as the baseline deterministic projection except that it assumes a -6.5% asset return for calendar year 2022.

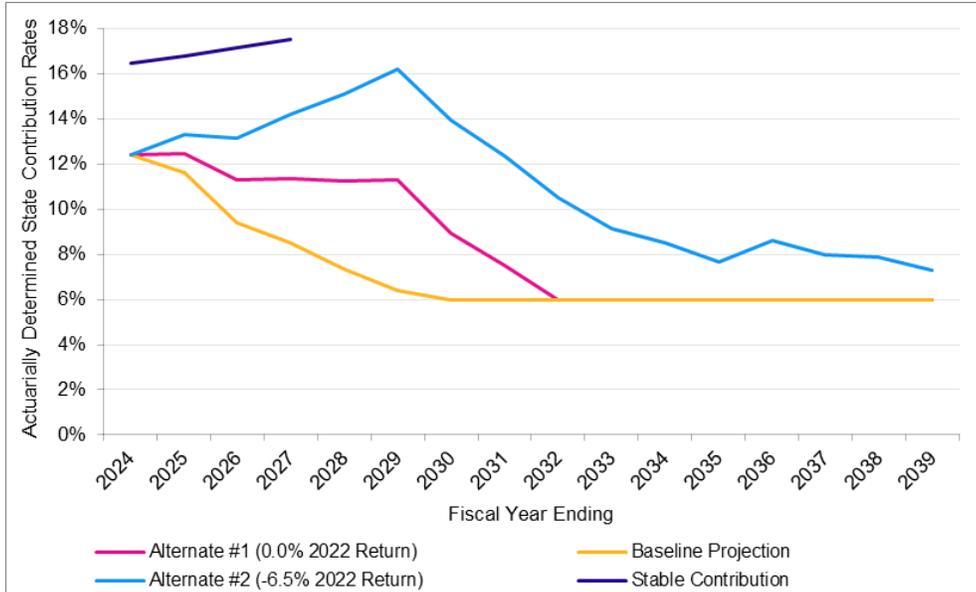
Finally, stochastic projections, where hundreds of projections based on varying rates of return are performed and results are ordered, are periodically performed by the Investment Management Division and shared with the Board of Trustees and RSD staff.

## Section 2: Valuation Process (continued)

### Graph 12: Valuation Results: Projections (continued)

#### Projected Actuarially Determined Employer Contribution Rates

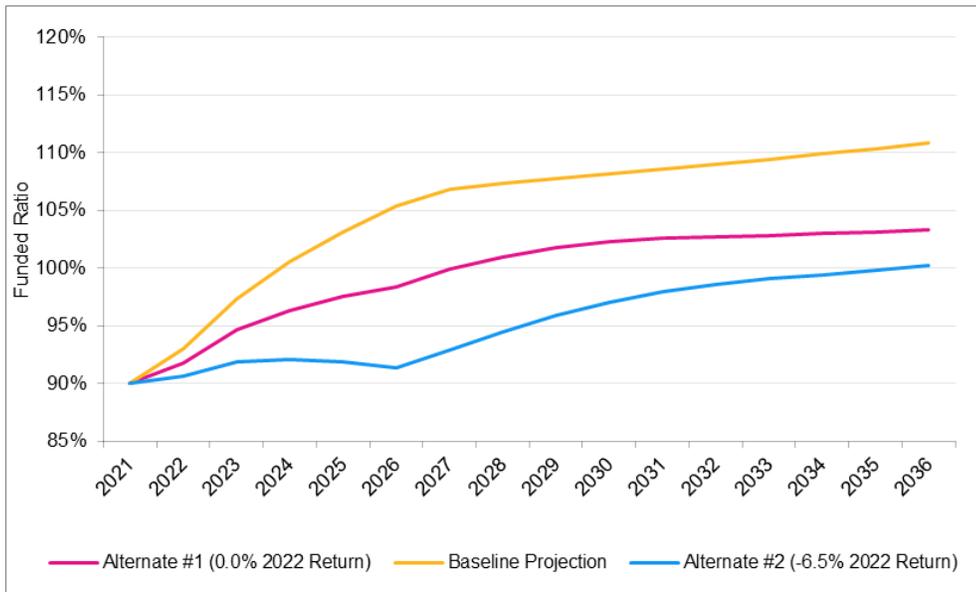
The graph below provides the actuarially determined employer contribution rates projected for 15 years.



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

### Graph 13: Projected Funded Ratio

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



**Commentary:** Note that if the 6.50% return under the Baseline Projection is achieved, the funded ratio reaches the long-term target of 100% within 3 years. This is a direct result of using a 12-year period to pay off the unfunded actuarial accrued liability.

A detailed summary of the deterministic projections is provided in Section 9 of this report.

## **Section 2: Valuation Process (continued)**

### **Valuation results: Accounting Information**

The Governmental Account Standards Board (GASB) issues statements which establish financial reporting standards for defined benefit pension plans and accounting for pension expenditures and expenses for governmental employers.

The valuation has been prepared in accordance with the parameters of Statement No. 67 of the GASB and all applicable Actuarial Standards of Practice. The Net Pension Liability (Asset) under GASB 67 for the fiscal year ending June 30, 2022, is \$14,842,238,000 (compared to \$4,682,601,000 for fiscal year ending June 30, 2021). The required financial reporting information for TSERS under GASB No. 67 can be found in Section 8 of this report.

## Section 3: 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 B.

**Table 2: Active Member Data**

	Member Count	Average Age	Average Service	Reported Compensation
Teachers, Librarians and Counselors	150,044	43.78	10.82	\$ 7,522,554,491
Other Education	47,042	49.69	11.52	2,115,983,524
General Employees	97,782	47.09	10.90	5,350,596,556
Law Enforcement Officers	5,442	40.43	11.85	323,090,012
Total	300,310	45.72	10.97	\$ 15,312,224,583

The table above includes members not in receipt of benefits who had reported compensation in 2021.

**Table 3: 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	1,671	55.93	14.11	\$ 64,197,778
Other Education	671	57.21	13.56	18,993,860
General Employees	2,594	56.15	13.10	94,923,829
Law Enforcement Officers	25	49.17	16.13	1,787,309
Total	4,961	56.18	13.52	\$ 179,902,776

The table above includes members not in receipt of benefits who did not have reported compensation in 2021 and who were reported as disabled in the current or prior valuations and not subsequently reported as returned to work.

**Table 4a: Terminated Vested Member Data**

	Member Count	Average Age	Average Service	Annual Deferred Retirement Allowances
Teachers, Librarians and Counselors	26,263	45.73	9.29	\$ 190,189,985
Other Education	5,964	50.42	10.10	47,054,678
General Employees	24,756	51.48	9.10	176,397,769
Law Enforcement Officers	681	44.59	10.08	6,036,689
Total	57,664	48.67	9.30	\$ 419,679,121

The table above includes vested members not in receipt of benefits who did not have reported compensation in 2021 and who were not valued as disabled members.

## Section 3: Membership Data (continued)

**Table 4b: Terminated Non-Vested Member Data**

	Member Count	Average Age	Average Service	Accumulated Contributions
Teachers, Librarians and Counselors	55,313	40.64	1.91	\$ 290,389,639
Other Education	15,511	44.90	1.62	52,384,272
General Employees	69,045	45.45	1.62	360,246,381
Law Enforcement Officers	1,109	39.19	2.18	7,746,008
Total	140,978	43.45	1.74	\$ 710,766,300

The table above includes non-vested members not in receipt of benefits who did not have reported compensation in 2021 and who were not valued as disabled members.

**Table 5: Data for Members Currently Receiving Benefits**

	Member Count	Average Age	Annual Retirement Allowances
<u>Retired Members (Healthy at Retirement)</u>			
Teachers and Other Education	119,938	71.27	\$ 2,856,546,577
General Employees	85,860	72.53	1,602,536,295
Law Enforcement Officers	3,382	65.76	110,124,362
Total	209,180	71.70	\$ 4,569,207,234
<u>Retired Members (Disabled at Retirement)*</u>			
Teachers and Other Education	4,631	71.89	\$ 89,128,982
General Employees	7,918	71.39	125,299,043
Law Enforcement Officers	169	69.11	4,259,710
Total	12,718	71.54	\$ 218,687,735
<u>Survivors of Deceased Members</u>			
Teachers and Other Education	5,565	73.40	\$ 104,925,072
General Employees	10,675	73.66	140,789,670
Law Enforcement Officers	514	72.94	11,207,334
Total	16,754	73.55	\$ 256,922,076
Grand Total	238,652	71.82	\$ 5,044,817,045

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

## Section 4: 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 6: Market Value of Assets**

Asset Data as of	12/31/2021	12/31/2020
Beginning of Year Market Value of Assets	\$ 81,969,425,086	\$ 75,486,780,473
Employer Contributions	2,403,844,588	2,220,834,130
Employee Contributions	995,528,156	972,729,960
Benefit Payments Other Than Refunds	(5,123,832,896)	(4,890,953,170)
Refunds	(111,847,477)	(99,462,455)
Administrative Expenses	(13,985,883)	(13,461,042)
Investment Income	<u>7,847,220,944</u>	<u>8,292,957,190</u>
Net Increase/(Decrease)	5,996,927,432	6,482,644,613
End of Year Market Value of Assets	\$ 87,966,352,518	\$ 81,969,425,086
Estimated Net Investment Return on Market Value	9.68%	11.12%

**Table 7: Allocation of Investments by Category of the Market Value of Assets**

Asset Data as of	12/31/2021	12/31/2020
Allocation by Dollar Amount		
Public Equity	\$ 31,544,976,279	\$ 30,140,335,002
Fixed Income (LTIF)	21,070,197,448	21,884,828,690
Cash and Receivables	12,611,142,538	8,918,812,993
Other*	<u>22,740,036,253</u>	<u>21,025,448,401</u>
Total Market Value of Assets	\$ 87,966,352,518	\$ 81,969,425,086
Allocation by Percentage of Asset Value		
Public Equity	35.9%	36.8%
Fixed Income (LTIF)	24.0%	26.7%
Cash and Receivables	14.3%	10.9%
Other*	<u>25.8%</u>	<u>25.6%</u>
Total Market Value of Assets	100.0%	100.0%

\* Real Estate, Alternatives, Inflation and Credit

## Section 4: 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 8: Actuarial Value of Assets**

Asset Data as of	12/31/2021
Beginning of Actuarial Value of Assets	\$ 77,922,070,039
Beginning of Year Market Value of Assets	\$ 81,969,425,086
Contributions	3,399,372,744
Benefit Payments	(5,249,666,256)
Net Cash Flow	(1,850,293,512)
Expected Investment Return	5,268,824,753
Expected End of Year Market Value of Assets	\$ 85,387,956,327
End of Year Market Value of Assets	\$ 87,966,352,518
Excess of Market Value over Expected Market Value of Assets	2,578,396,191
80% of 2021 Asset Gain/(Loss)	2,062,716,953
60% of 2020 Asset Gain/(Loss)	1,842,703,122
40% of 2019 Asset Gain/(Loss)	2,089,293,591
20% of 2018 Asset Gain/(Loss)	(1,167,819,246)
Total Deferred Asset Gain/(Loss)	4,826,894,420
Preliminary End of Year Actuarial Value of Assets	\$ 83,139,458,098
Final End of Year Actuarial Value of Assets (not less than 80% and not greater than 120% of Market Value)	\$ 83,139,458,098
Estimated Net Investment Return on Actuarial Value	9.18%

**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. Actuarial value of assets was reset to the market value of assets on December 31, 2014.

Higher than expected market returns in 2019, 2020, and 2021 resulted in an actuarial value of asset return for calendar year 2021 of 9.18% and a recognized actuarial asset gain of \$2.1 billion during 2021. Even after recognizing this gain, the assets at actuarial value were \$9.2 billion less than the actuarial accrued liability as of December 31, 2021.

## Section 4: 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 9: 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%
20-Yr Average	7.17%	6.73%	6.84%	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 6.73% compares with an average market return of 6.84%. 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 5: 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 10: Liability Summary**

Valuation Results as of	12/31/2021	12/31/2020
(a) Present Value of Future Benefits		
(1) Active Members	\$ 53,693,838,643	\$ 52,656,094,104
(2) Terminated Members	3,505,355,079	3,184,248,746
(3) Members Currently Receiving Benefits	50,448,715,615	49,174,094,142
(4) Total	\$ 107,647,909,337	\$ 105,014,436,992
(b) Present Value of Future Normal Costs		
(1) Employee Future Normal Costs	\$ 7,567,182,471	\$ 7,509,039,557
(2) Employer Future Normal Costs	7,724,500,960	7,696,323,361
(3) Total	\$ 15,291,683,431	\$ 15,205,362,918
(c) Actuarial Accrued Liability: (a4) - (b3)	\$ 92,356,225,906	\$ 89,809,074,074
(d) Actuarial Value of Assets	\$ 83,139,458,098	\$ 77,922,070,039
(e) Unfunded Accrued Liability: (c) - (d)	\$ 9,216,767,808	\$ 11,887,004,035

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 11: Reconciliation of Unfunded Actuarial Accrued Liability**

(in millions)	
Unfunded Actuarial Accrued Liability (UAAL) as of 12/31/2020	\$ 11,887
Normal Cost and Administrative Expense during 2021	1,873
Reduction due to Actual Contributions during 2021	(3,399)
Interest on UAAL, Normal Cost, and Contributions	785
Asset (Gain)/Loss	(2,062)
Actuarial Accrued Liability (Gain)/Loss	(66)
Impact of Assumption Changes	-
Impact of Benefit Changes	199
Unfunded Actuarial Accrued Liability (UAAL) as of 12/31/2021	\$ 9,217

**Commentary:** During 2021, the UAAL decreased primarily due to the asset gain of \$2,062 million. Additionally, demographic experience decreased the UAAL by \$216 million. Since the prior valuation, a transition from the prior actuarial firm to Buck resulted in an increase in UAAL of \$150 million due to valuation programming, modifications and differences in methodology, and benefit changes increased the UAAL by \$199 million.

## Section 6: 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 16.44% of payroll for fiscal year ending 2024 before recognizing any benefit improvements that may be enacted.

- The minimum (before considering the ADEC) is 16.44%; Board's recommended appropriation for the fiscal year ending 2023 of 16.09% (without regard to the cost of the Legislated One-Time Pension Supplement of 1.24% and the Legislated Unfunded Liability Solvency Reserve (ULSR) Contribution Pursuant to G.S. 143C-4-10(e) of 0.05%), plus 0.35%.
- 14.18% is the actuarially determined employer contribution calculated in this most recent valuation prior to direct-rate smoothing and before applying the ECRSP. 12.39% is the actuarially determined employer contribution after direct rate smoothing of the assumption and method changes.
- The maximum is approximately 92.11%; the estimated actuarially determined employer contribution using a discount rate equal to the long-term Treasury bond yield (1.90%).

**Table 12: Calculation of the Actuarially Determined Employer Contribution (ADEC)**

Valuation Date	12/31/2021	12/31/2020
ADEC for Fiscal Year Ending	6/30/2024	6/30/2023
Normal Cost Rate Calculation		
(a) Normal Cost Rate	6.23%	6.29%
(b) Expense Rate	<u>0.10%</u>	<u>0.10%</u>
(c) Total Normal Cost Rate	6.33%	6.39%
Accrued Liability Rate Calculation		
(d) Total Annual Amortization Payments*	\$ 1,346,262,327	\$ 1,888,258,829
(e) Projected Compensation**	17,158,811,726	16,966,950,517
(f) Accrued Liability Rate: (d) / (e)	7.85%	11.13%
Total ADEC (c) + (f)	14.18%	17.52%
ADEC with Direct Rate Smoothing	12.39%	15.13%
Impact of Benefit Changes***	<u>N/A</u>	<u>1.29%</u>
Final ADEC	N/A	16.42%

\*See Table 15 for more detail

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

\*\*\* FY 2023 rate includes Legislated One-Time Pension Supplement of 1.24% and Legislated Unfunded Liability Solvency Reserve (ULSR) Contribution Pursuant to G.S. 143C-4-10(e) of 0.05%. The contribution from the ULSR serves to reduce the unfunded liability of TSERS. Therefore, it is reasonable to include this amount as part of a contribution determined in accordance with actuarial standards of practice.

## Section 6: Actuarially Determined Employer Contribution (continued)

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

**Table 13: Reconciliation of the Change in the ADEC Prior to ECRSP**

Fiscal year ending June 30, 2023 Preliminary ADEC (based on December 31, 2020 valuation)	15.13%
Impact of Benefit Changes*	<u>1.29%</u>
Fiscal year ending June 30, 2023 Final ADEC	16.42%
Change Due to Anticipated Reduction in UAAL**	(1.91%)
Change Due to Demographic (Gain)/Loss	0.04%
Change Due to Investment (Gain)/Loss	(1.52%)
Change Due to Contributions Greater than ADEC	(0.11%)
Impact of Assumption Changes	0.00%
Impact of Benefit Changes	0.16%
Impact of Direct Rate Smoothing	0.60%
Reversal of one-time Benefit Costs	<u>(1.29%)</u>
Fiscal year ending June 30, 2024 Preliminary ADEC (based on December 31, 2021 valuation)	12.39%

\* Includes the Legislated One-Time Pension Supplement of 1.24% and the Legislated Unfunded Liability Solvency Reserve (ULSR) Contribution Pursuant to G.S. 143C-4-10(e) of 0.05%. The contribution from the ULSR serves to reduce the unfunded liability of TSERS. Therefore, it is reasonable to include this amount as part of a contribution determined in accordance with actuarial standards of practice.

\*\* Amortization of the UAAL included a fresh-start 9-year amortization for the December 31, 2009, valuation with the first payment effective July 1, 2011. However, the Appropriations Act of 2011 changed the period over which the UAAL is amortized from nine years to 12 years, retroactive to July 1, 2011, as implemented in the December 31, 2010, valuation. As such, the original amortization balance with current annual payments of \$319 million will be paid off as of June 30, 2023, which significantly reduces the ADEC before applying the ECRSP, effective for the fiscal year ending 2024.

## Section 6: 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 14: Calculation of the New Amortization Base**

Calculation as of	12/31/2021	12/31/2020
(a) Unfunded Actuarial Accrued Liability	\$ 9,216,767,808	\$ 11,887,004,035
(b) Prior Years' Outstanding Balances	\$ 10,924,236,174	\$ 10,745,847,397
(c) New Amortization Base: (a) - (b)	\$ (1,707,468,366)	\$ 1,141,156,638
(d) New Amortization Payment	\$ (222,882,152)	\$ 148,959,390

**Table 15: Amortization Schedule for Unfunded Accrued Liability**

Date Established	Original Balance	12/31/2021 Outstanding Balance	Annual Payment Effective July 1, 2023
December 31, 2009	\$ 2,360,173,025	\$ 456,701,524	\$ -
December 31, 2010	242,581,914	75,616,103	32,694,487
December 31, 2011	911,037,989	384,432,466	122,405,196
December 31, 2012	78,277,759	41,081,284	10,485,336
December 31, 2013	(114,027,863)	(70,781,715)	(15,228,907)
December 31, 2014	(206,952,282)	(146,981,000)	(27,559,708)
December 31, 2015	2,586,581,023	2,052,606,630	343,435,477
December 31, 2016	1,983,860,720	1,727,186,773	262,453,830
December 31, 2017	2,551,629,668	2,404,088,097	336,317,586
December 31, 2018	1,836,431,391	1,855,864,512	241,617,831
December 31, 2019	865,931,898	929,089,681	113,563,961
December 31, 2020	1,141,156,638	1,215,331,819	148,959,390
December 31, 2021	(1,707,468,366)	(1,707,468,366)	(222,882,152)
Total		\$ 9,216,767,808	\$ 1,346,262,327

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

## Section 6: Actuarially Determined Employer Contribution (continued)

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

**Table 16: 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
12/31/2021	6/30/2024	6.33%	7.85%	(1.79%)	N/A	N/A	N/A	N/A	N/A
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%
12/31/2016	6/30/2019	4.48%	7.50%	0.00%	0.31%	0.00%	12.29%	12.29%	12.29%

\* 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. The change due to legislation for the contribution for fiscal year ending June 30, 2019 provided for a one-time supplement equal to 1% of the annual retirement allowance payable in October 2018.

The following table shows estimates of the potential cost of two types of benefit improvements if they were enacted based on the results of the December 31, 2021 or December 31, 2020 valuations. The first benefit improvement is a permanent one-time cost-of-living increase and the second is an increase in the defined benefit formula multiplier.

**Table 17: Cost of Benefit Enhancements**

Calculation as of	12/31/2021	12/31/2020
Increase in UAAL for a 1% COLA	\$ 533,364,000	\$ 540,027,000
Increase in ADEC for a 1% COLA	0.41%	0.42%
Increase in UAAL for a 0.01% Increase in the Defined Benefit Formula	\$ 508,993,000	\$ 489,906,000
Increase in ADEC for a 0.01% Increase in the Defined Benefit Formula	0.46%	0.44%

The 1% COLA in the December 31, 2021 column would be effective July 1, 2023 and includes expected costs of COLAs paid for retirements after December 31, 2021 and before June 30, 2023. The COLA would be paid in full to retired members and survivors of deceased members on the retirement roll on July 1, 2022 and would be prorated for retired members and survivors of deceased members who commence benefits after July 1, 2022 but before June 30, 2023.

A corresponding increase in retirement allowances would be paid in the event of an increase in the defined benefit formula.

## Section 7: Valuation Balance Sheet

The valuation balance sheet shows the assets and liabilities of TSERS. The items shown in the balance sheet are present values actuarially determined as of the relevant valuation date. The table below provides the valuation balance sheet for the current year and prior year.

**Table 18: Valuation Balance Sheet on a Projected Basis**

Balance Sheet as of	12/31/2021	12/31/2020
<b>Assets</b>		
Current Actuarial Value of Assets		
Annuity Savings Fund	\$ 14,861,359,922	\$ 14,412,915,570
Pension Accumulation Fund	68,278,098,176	63,509,154,469
Total	\$ 83,139,458,098	\$ 77,922,070,039
Future Member Contributions to the Annuity Savings Fund	\$ 7,567,182,471	\$ 7,509,039,557
Prospective Contributions to the Pension Accumulation Fund		
Normal Contributions	\$ 7,724,500,960	\$ 7,696,323,361
Unfunded Accrued Liability Contributions	9,216,767,808	11,887,004,035
Total	\$ 16,941,268,768	\$ 19,583,327,396
Total Assets	\$107,647,909,337	\$105,014,436,992
<b>Liabilities</b>		
Annuity Savings Fund		
Past Member Contributions	\$ 14,861,359,922	\$ 14,412,915,570
Future Member Contributions	7,567,182,471	7,509,039,557
Total Contributions	\$ 22,428,542,393	\$ 21,921,955,127
Pension Accumulation Fund		
Benefits Currently in Payment	\$ 50,448,715,615	\$ 49,174,094,142
Benefits to be Paid to		
Current Active Members	34,770,651,329	33,918,387,723
Reserve for Increases in Retirement Allowances	0	0
Total Benefits Payable	\$ 85,219,366,944	\$ 83,092,481,865
Total Liabilities	\$107,647,909,337	\$105,014,436,992

## Section 8: Accounting Results

The section contains the accounting information for Governmental Accounting Standards Board (GASB) Statement No. 67 for fiscal year ending June 30, 2022 based on a valuation date of December 31, 2021.

The June 30, 2022 total pension liability presented in this section was determined by an actuarial valuation as of December 31, 2021, based on the assumptions, methods and plan provisions described in this report. The actuarial cost method used to develop the total pension liability is the Entry Age Normal Cost method, as required by GASB Statement No. 67.

GASB Statement No. 67 set forth certain items of information to be disclosed in the financial statements of the Plan. The tables below provide a distribution of the number of employees by type of membership.

**Table 19: Number of Active and Retired Members as of December 31, 2021**

<b>Group</b>	<b>Number</b>
Retired members and survivors of deceased members currently receiving benefits	238,652
Terminated members and survivors of deceased members entitled to benefits but not yet receiving benefits	198,642
Active members*	<u>305,271</u>
Total	742,565

\* Includes current recipients of DIP benefits.

## Section 8: Accounting Results (continued)

GASB Statement No. 67 set forth certain items of information to be disclosed in the financial statements of the Plan. The tables below provide the schedule of changes in Net Pension Liability (Asset).

**Table 20: Schedule of Changes in Net Pension Liability (Asset)**

Calculation as of	June 30, 2022
<b>Total Pension Liability</b>	
Service Cost	\$ 1,918,712,000
Interest	5,874,188,000
Changes of Benefit Terms	205,169,000
Difference between Expected and Actual Experience	(175,206,000)
Change of Assumptions	0
Benefit Payments, including Refund of Member Contributions	<u>(5,324,253,000)</u>
Net Change in Total Pension Liability	\$ 2,498,610,000
Total Pension Liability - Beginning of Year	\$ 91,073,632,000
Total Pension Liability - End of Year	\$ 93,572,242,000
<b>Plan Fiduciary Net Position</b>	
Employer Contributions	\$ 2,761,946,000
Member Contributions	1,030,635,000
Net Investment Income	(6,118,110,000)
Benefit Payments, including Refund of Member Contributions	(5,324,253,000)
Administrative Expenses	(13,945,000)
Other	<u>2,700,000</u>
Net Change in Fiduciary Net Position	\$ (7,661,027,000)
Plan Fiduciary Net Position - Beginning of Year	\$ 86,391,031,000
Plan Fiduciary Net Position - End of Year	\$ 78,730,004,000

**Table 21: Net Pension Liability (Asset)**

Calculation as of	June 30, 2022	June 30, 2021
Total Pension Liability	\$ 93,572,242,000	\$ 91,073,632,000
Plan Fiduciary Net Position	<u>78,730,004,000</u>	<u>86,391,031,000</u>
Net Pension Liability (Asset)	\$ 14,842,238,000	\$ 4,682,601,000
Plan Fiduciary Net Position as a Percentage of the Total Pension Liability	84.14%	94.86%

## Section 8: Accounting Results (continued)

The table below is the sensitivity of the net pension liability to changes in the discount rate.

**Table 22: Sensitivity of the Net Pension Liability (Asset) as of June 30, 2022 to Changes in the Discount Rate**

	1% Decrease	Current	1% Increase
Discount Rate	5.50%	6.50%	7.50%
Net Pension Liability (Asset)	26,241,833,000	14,842,238,000	5,432,784,000

The discount rate used to measure the total pension liability was 6.50%. The projection of cash flows used to determine the discount rate assumed that for fiscal year 2022, System contributions will follow the Employer Contribution Rate Stabilization Policy as adopted by the Board of Trustees on January 21, 2016, and “direct-rate smoothing” as adopted by the Board of Trustees on April 26, 2018. It is assumed that for fiscal years 2023 through 2027, System contributions will follow the Employer Contribution Rate Stabilization Policy as adopted by the Board of Trustees on January 28, 2021. It is assumed that for fiscal years 2028 and beyond, System contributions will be based on the actuarially determined contribution rate with a minimum employer contribution rate of 6.00% of payroll in accordance with G.S 135-8(d)(1a). In addition, assumed contributions include contributions based on payroll from future employees of the System that are not associated with the accumulation of their plan benefits. Investment earnings are based on actual returns through June 30, 2022, and on the assumed investment rate of return thereafter. In addition, future administrative expenses are assumed to equal 0.1% of projected payroll, but are limited to a flat dollar rate per active and in-pay member as of each valuation date. The flat dollar rate is \$27 in 2022 and increased by 2.5% each year thereafter. Based on those policies, the System’s fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Please see Appendix E for additional detail.

The table below provides the methods and assumptions used to calculate the actuarially determined contribution rate.

**Table 23: Additional Information for GASB Statement No. 67**

Valuation Date	12/31/2021
Actuarial Cost Method	Entry Age
Amortization Method	Level dollar closed
Amortization Period	12-year closed period
Asset Valuation Method	Asset returns in excess of or less than the expected return on market value of assets reflected over a five-year period (not greater than 120% of market value and not less than 80% of market value)
Actuarial Assumptions	
Investment Rate of Return*	6.50%
Projected Salary Increases**	3.25% - 8.05%
*Includes Inflation of	2.50%
**Includes Inflation and Productivity of	3.25%
Cost-of-living Adjustments	N/A

## Section 9: 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, 2021 valuation results as assumptions.

### Key Projection Assumptions

- Valuation interest rate of 6.50% for all years in conjunction with direct rate smoothing of the employer contribution rate 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 D. 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

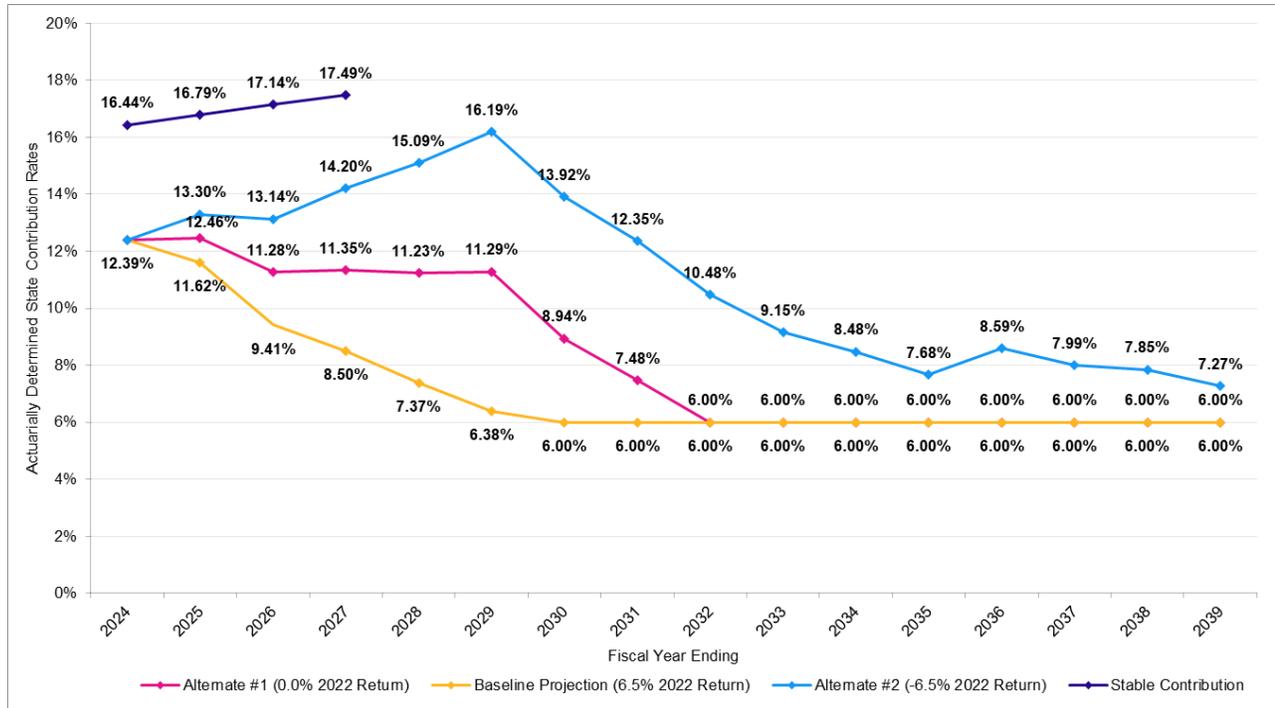
The ECRSP adopted by the Board of Trustees on April 29, 2021 for FYE 2023 through 2027 requires that recommended contributions be 0.35% of payroll greater than the appropriated contribution during the prior year, with the following bounds: (1) contributions may not be less than the actuarially determined employer contribution (ADEC) rate 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.

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 2022. The second alternate deterministic projection is based on the same assumptions as the baseline deterministic projection except that it assumes a -6.5% asset return for calendar year 2022.

# Section 9: Projections (continued)

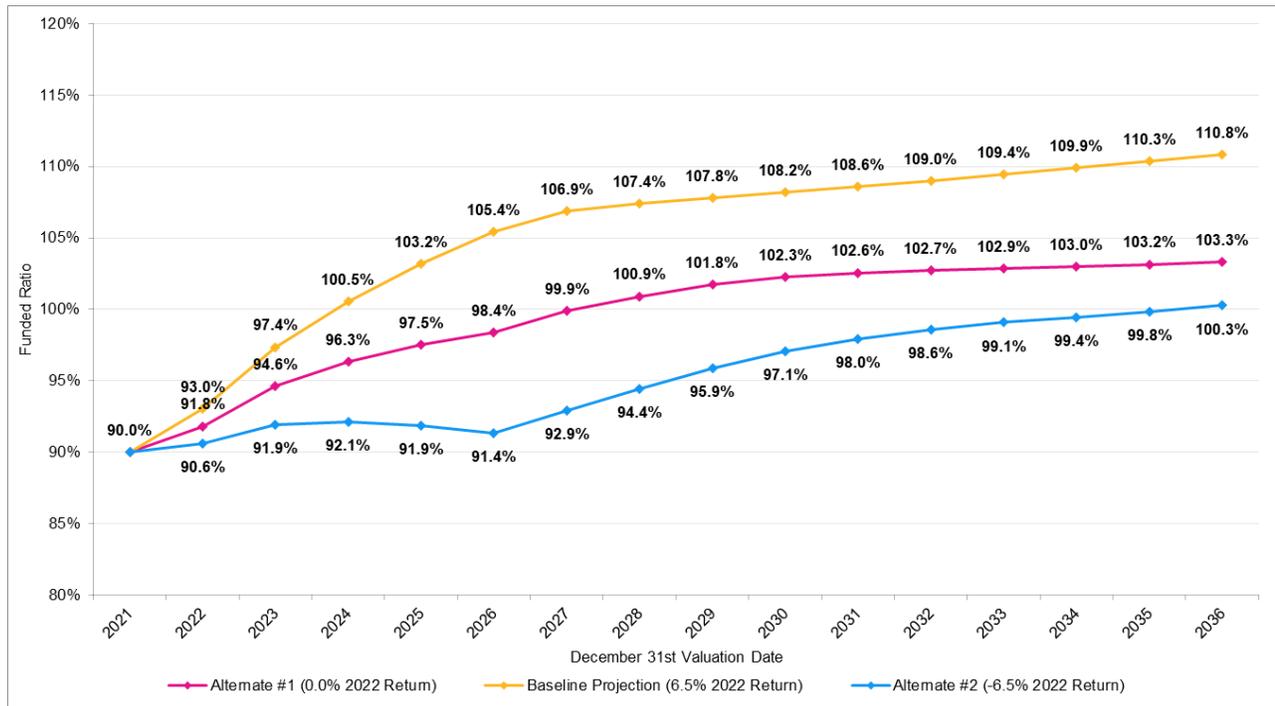
The graph below provides the actuarially determined employer contribution rates projected for 15 years.

## Projected Actuarially Determined Employer Contribution Rates



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

## Projected Funded Ratio



# Appendix A: Valuation Process and Glossary of Actuarial Terms

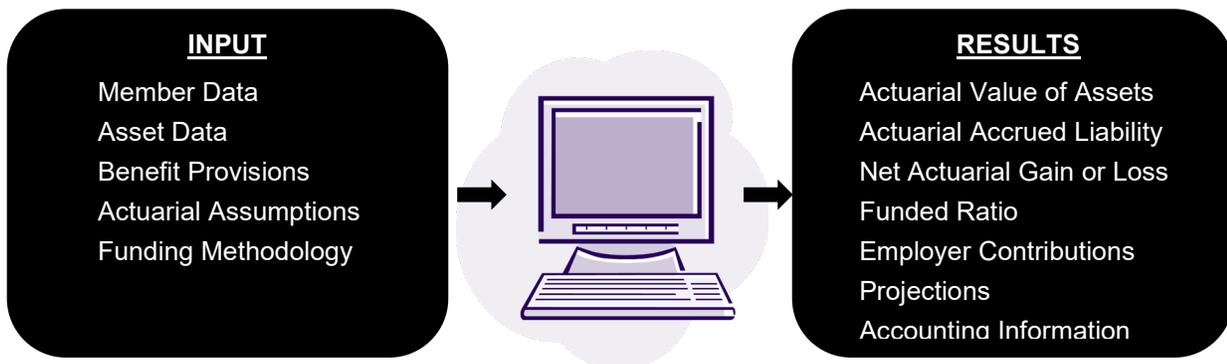
## Purpose of an Actuarial Valuation

The majority of Public Sector Retirement Systems in the State of North Carolina are defined benefit (DB) retirement systems. Under a DB Retirement System, the amount of benefits payable to a member upon retirement, termination, death or disability is defined in various contracts and legal instruments and is based, in part, on the member's years of credited service and final compensation. The amount of contribution needed to fund these benefits cannot be known with certainty. A primary responsibility of the Board of Trustees of a Retirement System is to establish and monitor a funding policy for the contributions made to the Retirement System.

While somewhat uncommon, in some jurisdictions, contributions are made by the plan sponsor as benefits come due. This is known as pay-as-you-go financing. More commonly, contributions for benefits are made in advance during the course of active employment of the members. This is known as actuarial pre-funding. For example, the State of North Carolina mandates for the Teachers' and State Employees' Retirement System ("TSERS") under G.S.135-8(d), that "on account of each member there shall be paid into the pension accumulation fund by employers an amount equal to a certain percentage of the actual compensation of each member to be known as the 'normal contribution' and an additional amount equal to a percentage of the member's actual compensation to be known as the 'accrued liability contribution'. The rate per centum of such contributions shall be fixed on the basis of the liabilities of the Retirement System as shown by actuarial valuation, duly approved by the Board of Trustees, and shall be called the 'actuarially determined employer contribution rate'...The actuarially determined employer contribution rate shall be calculated annually by the actuary using assumptions and a cost method approved by the Actuarial Standards Board of the American Academy of Actuaries and selected by the Board of Trustees."

## Actuarial Valuation Process

The following diagram summarizes the inputs and results of the actuarial valuation process. A narrative of the process follows the diagram. The reader may find it worthwhile to refer to the diagram from time to time.



Under the actuarial valuation process, current information about Retirement System members is collected annually by staff at the direction of the actuary, namely member data, asset data and information on benefit provisions. Member data is collected for each member of the Retirement System. The member data will assist the actuary in estimating benefits that could be paid in the future. The member information the actuary collects to estimate the amount of benefit includes elements such as current service, salary and benefit group identifier for members that have not separated service; for those that have, the actual benefit amounts are collected. The actuary collects information such as gender and date of birth to determine when a benefit might be paid and for how long.

## **Appendix A: Valuation Process and Glossary of Actuarial Terms (continued)**

### **Actuarial Valuation Process (continued)**

The actuary collects summary information about assets as of the valuation date and information on cash flows for the year ending on the valuation date. Information about benefit provisions as of the valuation date is also collected. To bridge the gap between the information collected and potential benefits to be paid in the future, the actuary must make assumptions about future activities. These assumptions are recommended by the actuary to the Boards based on the results of an experience review. An experience review is a review of the Retirement System over a period of time, typically five years, where the actuary analyzes the demographic and economic assumptions of the Retirement System. Based on this review, the actuary will make recommendations on the demographic assumptions, such as when members will be projected to retire, terminate, become disabled and/or die in the future, as well as the economic assumptions, such as what rate of return is projected to be earned by the fund based on the Retirement System investment policy and what level of future salary increases is expected for members. To maintain the assumptions, the Board should adopt a prudent policy of having an experience review being performed every five years. The next experience review for the North Carolina Retirement Systems will be based on the five-year period ending on December 31, 2024 and will be presented during 2025. Using these assumptions, the actuary is able to use the member data, asset data and benefit provision information collected to project the benefits that will be paid from the Retirement System to current members. These projected future benefit payments are based not only on service and pay through the valuation date but includes future pay and service, which has not yet been earned by the members but is expected to be earned.

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 (PVFB) of the Retirement System. The PVFB is an estimate of the value of the benefits promised to all members as of a valuation date. If the Retirement System held assets equal to the PVFB and all the assumptions were realized, there would be sufficient funds to pay off all the benefits to be paid in the future for members in the Retirement System as of the valuation date.

The PVFB is a large sum of money, typically much larger than the amount of Retirement System assets held in the trust. The next step is for the actuary to apply the Funding Policy as adopted by the Board to determine the employer contributions to be made to the Retirement System so that the gap between the PVFB and assets is systematically paid off over time. The Funding Policy is adopted by the Board based on discussions with the actuary. When the Board develops a funding policy, a balance between contributions that are responsive to the needs of the Retirement System yet stable should be struck. There are many different funding policies for the Board to consider, and the actuary is responsible for discussing the various features of the funding policies under consideration. Funding Policies are generally reviewed during an experience review, but it is not uncommon to review a funding policy in between, particularly during period where large increases or decreases in contributions are expected. The Funding Policy is composed of three components: the actuarial cost method, the asset valuation method, and the amortization method.

Once the PVFB is developed, an actuarial cost method is used to allocate the PVFB. Under the actuarial cost method, the PVFB is allocated to past, current and future service, respectively known as the actuarial accrued liability (AAL), normal cost (NC) and present value of future normal costs (PVFNC). The actuary computes the liability components (PVFB, NC, AAL, and PVFNC) for each participant in the Retirement System at the valuation date. These liability components are then totaled for the Retirement System. There are many actuarial cost methods. Different actuarial methods will produce different contribution patterns, but do not change the ultimate cost of the benefits. The entry age normal cost method is the most prevalent method used for public sector plans in the United States, because the expected normal cost is calculated in such a way that it will tend to stay level as a percent of pay over a member's career.

## **Appendix A: Valuation Process and Glossary of Actuarial Terms (continued)**

### **Actuarial Valuation Process (continued)**

The actuarial accrued liability (AAL) is also referred to as the amount of money the Retirement System should ideally have in the trust. The unfunded actuarial accrued liability (UAAL) is the portion of actuarial accrued liability that is not covered by the assets of the Retirement System. The UAAL can be a negative number, which means that the Retirement System has more assets than actuarial accrued liability. We refer to this condition as overfunded liability in this summary. Having UAAL does not indicate that the Retirement System is in failing actuarial health. Most retirement systems have UAAL. Another related statistic of the Retirement System is the funded ratio. The funded ratio is the percent of the actuarial accrued liabilities covered by the actuarial value of assets. The assets used for these purposes are an actuarial value of assets (AVA), not market. The actuarial value of assets is based on the asset valuation method as recommended by the actuary and adopted by the Board. An actuarial value of assets is a smoothed, or averaged, value of assets, which is used to limit employer contribution volatility. Typically, assets are smoothed, or averaged, over a period of 3 to 5 years. By averaging returns, the UAAL is not as volatile, which we will see later results in contributions that are not as volatile as well. The North Carolina Retirement Systems use an actuarial value of assets with a smoothing period of 5 years.

While having UAAL is common, it is acceptable only if it is systematically being paid off. The method by which the UAAL is paid off is known as the amortization method. The concept is similar to that of a mortgage payment. The Board adopts the amortization method used to pay off the UAAL over a period of time. The amortization method is composed of the amortization period, the amount of payment increase, whether the period is open or closed and by the amount of amortization schedules. The amortization period is the amount of time over which the UAAL will be paid off. This is generally a period of twenty-five years or less, but actuaries may recommend shorter periods. The payments can be developed to stay constant from year to year like a mortgage, but often they are developed to increase each year at the same level payroll increases. Amortization type can be closed or open. Under a closed period, the UAAL is expected to be paid off over the amortization period. This is similar to a typical mortgage. Under an open period, the amortization period remains unchanged year after year. The concept is similar to re-mortgaging annually. In many instances, an amortization schedule is developed, whereby the UAAL is amortized over a closed period from the point the UAAL is incurred. Finally, some amortization methods are defined by a schedule of payments, where a new schedule of payments is added with each valuation. Regardless of the amortization type or period, the funding policy should generate a contribution that pays off the UAAL, which results in the funded ratio trending to 100% over time. Caution should be used when an open method is used, because typically an open amortization policy does not result in the UAAL being paid off. North Carolina pays off a much larger amount of UAAL compared to other states. While many states struggle to pay a 30-year level percent of pay UAAL contribution, North Carolina pays down the UAAL with level dollar payments over 12 years. This aggressive payment of UAAL results in North Carolina being home to many of the best funded Public Retirement Systems in the United States.

To satisfy the requirements of the State of North Carolina, the actuary calculates the total annual contribution to the Retirement System as the normal cost plus a contribution towards UAAL. Said another way, this contribution is sufficient to pay for the cost of benefits accruing during the year (normal cost) plus the UAAL payment. The total contribution is reduced by the amount of member contributions, if any, to arrive at the employer contribution. Continuing to follow the aggressive North Carolina contribution policy will keep the North Carolina Retirement Systems among the best funded in the United States.

## **Appendix A: Valuation Process and Glossary of Actuarial Terms (continued)**

### **Actuarial Valuation Process (continued)**

An actuarial valuation report is produced annually, which contains the contribution for the fiscal year as well as the funded ratio of the Retirement System. The primary purpose of performing an actuarial valuation annually is to replace the estimated activities from the previous valuation, which were based on assumptions, with the actual experience of the Retirement System for the prior year. The experience gain (loss) is the difference between the expected and the actual UAAL of the Retirement System. An experience loss can be thought of as the amount of additional UAAL over and above the amount that was expected from the prior year due to deviation of actual experience from the assumption. Similarly, an experience gain can be thought of as having less UAAL than that which was expected from the prior year assumptions. As an example, if the Retirement System achieves an asset return of 15% when the assumption was a 6.50% return, an actuarial gain is said to have happened, which typically results in lower contributions and higher funded ratio, all else being equal. Alternatively, a return of 2% under the same circumstances would result in an actuarial loss, requiring an increase in contributions and a funded ratio that is lower than anticipated. Experience gains and losses are common within the valuation process. Typically gains and losses offset each other over time. To the extent that does not occur, the reasons for the gains and losses should be understood, and appropriate recommendations should be made by the actuary after an experience review to adjust the assumptions.

The actuarial valuation report will contain histories of key statistics from prior actuarial valuation reports. In particular, a history of the funded ratio of the Retirement System is an important exhibit. Trustees should understand the reason for the trend of the funded ratio of the Retirement System over time. The actuary will discuss the reasons for changes in the funded ratio of the Retirement System with each valuation report. To the extent that there are unexplained changes in funded ratio corrective action should be explored and the actuary will make recommendations as to whether there should be changes in the assumptions, funding policy, or some other portion of the actuarial valuation process.

In addition to historical information, projections of contributions and funded ratio based on current assumptions can sometimes be found in an actuarial valuation report. Projections of contributions can allow the employer to plan their budget accordingly. Surprises in Retirement System contributions to be paid by the employer serve no one. A one-year projection based on “bad” asset returns can provide ample time for the employer to plan or allow for a discussion of changing the funding policy to occur. Contribution surprises are a primary contributor to employers considering pension reform. It is important to keep the employer apprised of future contribution requirements. A projection of funded ratio can serve the Trustees by illustrating the trend of the funded ratio over time. The funded ratio, under a prudent funding policy, should trend to 100% over a period of less than 25 years. If a projection of funded ratio does not trend to 100% over time, consideration should be given to fixing the funding policy to achieve this goal. For the largest North Carolina Retirement Systems, projections are generally performed for the January board meetings.

The actuarial report will contain schedules of information about the census, plan and asset information submitted by Retirement System staff upon which the actuarial valuation is based. It is important that the Board of Trustees review that information and determine if the information is consistent with their understanding of the Retirement System. If after questioning staff, the Board of Trustees is not comfortable that the information provided is correct, the actuary should be notified to determine if the actuarial valuation report should be corrected.

Finally, the valuation report and/or presentation should contain sufficient information in an understandable fashion to allow the Board to take action and adopt the contribution rate for the upcoming year. It should also allow stakeholders to understand key observations over the past year that resulted in contributions increasing (or decreasing) and where contributions are headed. The actuary is always open to making the results understandable. Buck works with the North Carolina Retirement Systems Division to make your reports and presentations understandable and actionable. If something doesn't make sense – speak up!!

# Appendix A: Valuation Process and Glossary of Actuarial Terms (continued)

## Glossary

Note that the first definitions given are the “official” definitions of the term. For some terms there is a second definition, in italics, which is the unofficial definition.

### Actuarial Accrued Liability (AAL)

The portion of the Present Value of Projected Benefits (PVFB) allocated to past service. Also difference between (i) the actuarial present value of future benefits, and (ii) the present value of future normal cost. Sometimes referred to as “accrued liability” or “past service liability.” The amount of money that should be in the Fund. *The funding target.*

### Actuarial Assumptions

Estimates of future plan experience with respect to rates of mortality, disability, retirement, investment income and salary increases. Demographic (“people”) assumptions (rates of mortality, separation, and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic (“money”) assumptions (salary increases and investment income) consist of an underlying rate appropriate in an inflation-free environment plus a provision for a long-term average rate of inflation. *Estimates of future events used to project what we know now- current member data, assets, and benefit provisions – into an estimate of future benefits.*

### Actuarial Cost Method

A mathematical budgeting procedure for allocating the dollar amount of the Present Value of Projected Benefits (PVFB) between the normal costs to be paid in the future and the actuarial accrued liability. Sometimes referred to as the “actuarial funding method.”

### Actuarial Methods

The collective term for the Actuarial Cost Method, the Amortization Payment for UAAL Method, and the Asset Valuation Method used to develop the contribution requirements for the Retirement System. *The funding policy.*

### Actuarial Equivalent

Benefits whose actuarial present values are equal.

### Actuarial Present Value

The amount of funds presently required to provide a payment or series of payments in the future. It is determined by discounting the future payments at a predetermined rate of interest, taking into account the probability of payment.

### Actuarial Value of Assets (AVA)

A smoothed value of assets which is used to limit contribution volatility. Also known as the funding value of assets. *Smoothed value of assets.*

# Appendix A: Valuation Process and Glossary of Actuarial Terms (continued)

## Glossary (continued)

### Amortization Payment for UAAL

Payment of the unfunded actuarial accrued liability by means of periodic contributions of interest and principal, as opposed to a lump sum payment. The components of the amortization payment for UAAL includes:

- Amortization Period Length  
Generally, amortization periods of up to 15 to 20 years (and certainly not longer than 25) are allowed. Similar to a mortgage, the shorter the amortization period, the higher the payment and the faster the UAAL is paid off.
- Amortization payment increases  
Future payments can be level dollar, like a mortgage, or as a level percent of pay. Most Retirement Systems amortize UAAL as a level percent of pay which when combined with the employer normal cost that is developed as a level percent of pay can result in contributions that are easier to budget.
- Amortization type  
Amortization schedule can be closed or open. A closed amortization schedule is similar to a mortgage – at the end of the amortization period the UAAL is designed to be paid off. An open amortization period is similar to refinancing the UAAL year after year.
- Amortization schedule  
UAAL can be amortized over a single amortization period, or it can be amortized over a schedule.

*The amortization payment for UAAL can be thought of as the UAAL mortgage payment.*

### Asset Valuation Method

The components of how the actuarial value of assets is to be developed. TSERS uses a five-year smoothing of asset gains and losses, which is the most commonly used method.

### Experience Gain Loss

A measure of the difference between actual experience and experience anticipated by a set of actuarial assumptions during the period between two actuarial valuation dates, in accordance with the actuarial cost method being used. *The experience Gain (Loss) represents how much the actuary missed the mark in a given year.*

### Funded Ratio

The percent of the actuarial accrued liabilities covered by the actuarial value of assets. Also known as the funded status. *The ratio of how much money you actually have in the fund to the amount you should have in the fund.*

### Normal Cost

The annual cost assigned, under the actuarial funding method, to current and subsequent plan years. Sometimes referred to as “current service cost.” An amortization payment toward the unfunded actuarial accrued liability is paid in addition to the normal cost to arrive at the total contribution in a given year. *The cost of benefits accruing during the year.*

# Appendix A: Valuation Process and Glossary of Actuarial Terms (continued)

## Glossary (continued)

### Present Value of Future Normal Cost (PVFNC)

The portion of the Present Value of Projected Benefits (PVFB) allocated to future service. *The value in today's dollars of the amount of contribution to be made in the future for benefits accruing for members in the Retirement System as of the valuation date.*

### Present Value of Future Benefits (PVFB)

The projected future benefit payments of the plan are discounted into today's dollars using an assumed rate of investment return assumption to determine the Present Value of Future Benefits (PVFB) of the Retirement System. The PVFB is the discounted value of the projected benefits promised to all members as of a valuation date, including future pay and service for members which has not yet been earned. *If the Retirement System held assets equal to the PVFB and all the assumptions were realized, there would be sufficient funds to pay off all the benefits to be paid in the future for members in the Retirement System as of the valuation date.*

### Reserve Account

An account used to indicate that funds have been set aside for a specific purpose and are not generally available for other uses.

### Unfunded Actuarial Accrued Liability (UAAL)

The difference between the actuarial accrued liability (AAL) and actuarial value of assets (AVA). The UAAL is sometimes referred to as "unfunded accrued liability." *Funding shortfall, or prefunded amount if negative.*

### Valuation Date

The date that the actuarial valuation calculations are performed as of. *Also known as the "snapshot date".*

## Appendix B: Detailed Tabulations of Member Data

**Table B-1: Number and Average Reported Compensation of Active Members Distributed by Age and Service as of December 31, 2021**

Age	Years of Service										Total
	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	
Under 25	5,155	4,640	28	0	0	0	0	0	0	0	9,823
	15,811	38,690	36,542	0	0	0	0	0	0	0	26,677
25 to 29	4,696	14,771	4,784	9	0	0	0	0	0	0	24,260
	16,797	41,391	46,828	60,418	0	0	0	0	0	0	37,710
30 to 34	3,644	10,402	13,576	3,337	28	0	0	0	0	0	30,987
	16,287	43,341	49,867	55,267	46,193	0	0	0	0	0	44,306
35 to 39	2,875	8,569	9,169	9,663	3,983	28	0	0	0	0	34,287
	16,976	45,139	52,421	59,105	61,961	55,026	0	0	0	0	50,623
40 to 44	2,542	7,689	8,018	6,711	10,399	3,454	20	0	0	0	38,833
	17,108	46,308	52,844	59,446	64,599	65,398	56,353	0	0	0	54,618
45 to 49	2,215	7,127	7,566	6,323	7,531	9,184	2,736	6	0	0	42,688
	17,631	46,223	51,653	58,219	61,697	67,084	68,925	71,317	0	0	56,155
50 to 54	2,080	6,710	7,476	6,911	8,046	7,269	6,985	866	8	0	46,351
	17,401	46,633	50,718	55,868	58,771	62,645	71,155	73,828	59,929	0	56,181
55 to 59	1,599	5,328	6,035	5,799	7,007	5,979	4,028	1,500	213	3	37,491
	17,866	46,930	49,053	52,867	54,578	57,641	64,812	74,183	70,599	67,818	53,236
60 to 64	858	3,409	4,301	4,029	4,829	4,047	2,030	909	444	88	24,944
	18,015	46,023	49,228	53,538	54,640	57,006	61,711	72,245	79,694	67,666	53,184
65 to 69	328	1,041	1,536	1,412	1,374	963	549	294	170	147	7,814
	15,449	45,801	51,658	57,063	58,255	60,702	67,370	74,534	81,799	81,340	55,788
70 & Up	155	433	513	490	502	308	162	98	61	110	2,832
	12,051	39,271	44,111	48,414	55,009	63,591	64,622	71,796	104,288	89,535	51,603
Total	26,147	70,119	63,002	44,684	43,699	31,232	16,510	3,673	896	348	300,310
	16,760	44,190	50,572	56,751	59,757	62,509	67,869	73,579	79,429	80,356	50,988

## Appendix B: Detailed Tabulations of Member Data (continued)

**Table B-2: Number and Reported Compensation of Active Members Distributed by Age as of December 31, 2021**

Age	Men		Women	
	Number	Compensation	Number	Compensation
18	2	\$ 14,082	10	\$ 44,101
19	29	414,065	31	318,414
20	78	1,277,578	107	1,558,252
21	190	3,833,053	303	4,737,584
22	313	7,487,986	821	15,075,538
23	658	17,120,487	1,959	44,865,676
24	902	28,139,609	2,555	77,396,057
25	1,073	36,590,079	2,874	94,509,191
26	1,205	44,044,569	3,110	108,979,961
27	1,407	53,776,885	3,365	122,287,660
28	1,439	57,427,887	3,574	134,795,386
29	1,538	62,715,054	3,789	147,597,981
30	1,620	69,000,238	4,054	163,123,655
31	1,784	78,974,069	4,296	179,725,800
32	1,848	84,590,734	4,354	186,969,773
33	1,859	87,566,068	4,457	195,627,962
34	1,863	89,865,234	4,428	199,528,335
35	1,868	94,346,565	4,529	209,298,896
36	1,950	103,450,334	4,571	216,404,502
37	2,014	107,776,985	4,767	230,218,369
38	2,066	112,817,322	4,797	238,641,012
39	2,170	122,504,920	5,072	257,110,369
40	2,173	124,084,844	5,353	272,920,669
41	2,166	124,675,897	5,380	280,627,425
42	2,262	134,896,366	5,478	287,757,585
43	2,208	132,776,197	5,532	293,505,657
44	2,322	140,966,393	5,662	302,313,700
45	2,328	142,592,111	5,861	311,409,798
46	2,278	140,961,698	5,596	299,600,765
47	2,444	150,197,048	6,010	321,844,050
48	2,519	155,800,648	6,056	326,448,484
49	2,614	164,723,992	6,364	339,845,460
50	2,814	176,597,375	6,749	367,745,795
51	3,009	185,806,558	7,287	392,486,970
52	2,781	178,977,421	6,925	374,215,615
53	2,648	169,186,291	6,382	342,853,734
54	2,512	157,731,457	5,865	304,402,126
55	2,347	147,724,434	5,718	295,509,507
56	2,373	144,014,833	5,355	270,234,745
57	2,269	135,127,031	5,165	259,775,098

## Appendix B: Detailed Tabulations of Member Data (continued)

**Table B-2: Number and Reported Compensation of Active Members Distributed by Age as of December 31, 2021 (continued)**

Age	Men		Women	
	Number	Compensation	Number	Compensation
58	2,240	\$ 133,227,037	5,201	\$ 263,403,702
59	2,252	131,905,877	5,056	250,693,326
60	2,088	121,482,604	4,929	244,594,753
61	1,961	115,462,546	4,203	207,961,729
62	1,703	99,748,966	3,681	184,856,123
63	1,463	87,217,452	3,002	151,954,123
64	1,314	78,932,318	2,494	127,226,772
65	1,097	70,740,586	1,984	102,884,215
66	787	48,000,695	1,410	73,281,751
67	627	40,047,656	874	43,995,099
68	515	33,214,317	745	39,285,303
69	399	24,030,923	542	26,764,471
70	354	20,895,320	440	23,057,899
71	280	16,575,074	352	17,648,158
72	192	10,312,161	222	9,310,096
73	177	9,608,717	175	7,287,781
74	141	8,552,390	141	6,417,480
75	127	7,812,247	111	4,661,704
76	67	3,831,182	70	3,159,304
77	52	3,100,760	50	2,274,243
78	42	2,381,618	42	1,804,775
79	39	2,025,700	38	1,291,332
80	21	1,217,013	15	654,326
81	13	689,121	10	326,693
82	17	1,023,329	9	400,053
83	6	330,916	6	268,821
84	7	179,137	1	24,157
85	2	146,566	3	164,887
86	4	243,955	3	146,154
88	2	95,032	2	95,649
89	1	60,934	2	74,840
90	1	179,932	1	54,340
90	1	179,932	1	54,340
97			1	42,390
Total	89,935	\$ 5,044,026,410	210,377	\$ 10,268,432,446

## Appendix B: Detailed Tabulations of Member Data (continued)

**Table B-3: Number and Reported Compensation of Active Members Distributed by Service as of December 31, 2021**

Service	Men		Women	
	Number	Compensation	Number	Compensation
0	4,497	\$ 56,772,275	14,132	\$ 178,298,634
1	5,900	220,312,259	13,850	485,007,543
2	5,350	253,839,252	13,176	540,460,597
3	5,576	276,987,000	12,519	529,157,248
4	5,005	250,360,405	11,033	487,782,963
5	4,712	248,273,519	10,361	473,629,793
6	4,427	239,306,172	9,221	433,441,002
7	3,935	215,701,646	8,628	421,195,177
8	3,608	200,642,108	7,880	392,886,571
9	3,519	194,953,789	7,842	397,578,536
10	3,147	183,540,694	6,645	351,691,741
11	2,745	166,051,865	5,838	317,244,558
12	2,419	147,368,145	5,067	279,048,715
13	2,036	130,007,925	4,696	257,024,680
14	3,155	191,450,122	7,246	398,536,535
15	2,849	181,968,352	7,068	395,631,929
16	2,869	183,801,795	7,224	408,732,148
17	2,678	171,628,725	6,545	375,776,156
18	2,440	157,968,317	6,058	349,788,653
19	2,184	143,205,437	5,316	313,729,500
20	1,849	125,229,168	4,842	286,732,914
21	1,913	131,585,881	5,031	297,282,663
22	1,827	126,879,532	4,828	284,798,295
23	1,758	124,885,208	4,515	268,366,622
24	1,652	116,189,879	3,978	241,164,090
25	1,402	101,028,382	3,454	213,587,726
26	1,349	100,798,449	2,966	187,734,693
27	1,128	82,809,672	2,484	160,932,701
28	1,131	84,026,666	2,211	145,485,570
29	783	61,699,283	1,733	116,043,788
30	536	41,800,576	1,104	76,108,903
31	310	25,847,759	624	43,209,447
32	321	27,259,279	560	39,219,495
33	211	17,278,539	422	28,268,699
34	187	15,094,570	327	22,299,847
35	122	10,053,546	232	17,063,117
36	84	7,535,221	155	11,431,738
37	71	6,007,378	137	10,297,461
38	58	5,177,058	108	7,880,549
39	41	4,134,971	64	4,589,900

## Appendix B: Detailed Tabulations of Member Data (continued)

**Table B-3: Number and Reported Compensation of Active Members Distributed by Service as of December 31, 2021 (continued)**

Service	Men		Women	
	Number	Compensation	Number	Compensation
40	30	\$ 2,906,021	51	\$ 4,365,494
41	32	2,811,195	40	2,716,187
42	13	1,626,600	26	1,774,101
43	23	2,323,646	38	2,914,090
44	12	1,239,247	31	2,108,399
45	6	426,529	21	1,672,836
46	6	468,433	8	794,528
47	7	512,968	7	659,098
48	6	456,898	11	739,804
49	4	414,315	4	263,001
50	4	335,884	5	358,661
51			4	279,820
52	4	443,480	6	356,976
53	1	174,126	1	66,413
54	1	143,797	1	54,340
59			1	37,835
61	1	102,520		
65			1	75,626
Total	89,934	\$ 5,043,846,478	210,376	\$ 10,268,378,106

## Appendix B: Detailed Tabulations of Member Data (continued)

**Table B-4: Number and Valuation Compensation of Disabled Members Distributed by Age as of December 31, 2021**

Age	Men		Women	
	Number	Compensation	Number	Compensation
28	1	\$ 46,600		
29			1	
30	2	54,500		
31			1	23,958
32	2	45,740	3	63,002
33	2	31,861	1	43,772
34	1		8	271,929
35	1	29,468	4	109,921
36	1	29,458	6	246,575
37	4	156,579	9	321,657
38	5	123,273	10	305,809
39	5	163,376	14	559,376
40	4	134,873	19	696,391
41	6	185,434	12	479,398
42	8	326,787	24	842,070
43	7	200,571	38	1,362,715
44	18	647,072	44	1,639,629
45	19	721,403	49	1,828,099
46	18	731,698	60	2,355,133
47	34	1,326,584	69	2,663,490
48	39	1,478,237	61	2,365,350
49	44	1,825,430	89	3,422,496
50	41	1,526,994	121	4,628,642
51	50	2,122,805	118	4,227,726
52	49	1,877,302	148	5,825,444
53	54	2,049,111	139	5,607,135
54	73	2,788,260	168	6,128,615
55	63	2,859,505	183	6,327,274
56	70	2,777,549	198	7,336,847
57	94	3,423,675	225	8,024,114
58	75	2,878,585	241	7,799,796
59	107	3,987,764	236	8,548,953
60	103	3,698,102	240	7,709,330
61	85	3,187,699	240	8,002,479
62	87	3,410,918	205	7,004,490
63	97	3,514,739	188	6,357,313
64	100	3,813,411	211	7,487,567
65	66	2,480,271	114	3,724,272
66	7	255,382	8	307,284
67	2	56,114	1	27,390

## Appendix B: Detailed Tabulations of Member Data (continued)

**Table B-4: Number and Valuation Compensation of Disabled Members Distributed by Age as of December 31, 2021 (continued)**

Age	Men		Women	
	Number	Compensation	Number	Compensation
68	1	\$ 54,675	1	\$ 12,511
69	2	30,282		
70	1	45,038	2	26,200
71	1	22,440	1	48,240
75			1	
80			1	20,819
Total	1,449	\$ 55,119,565	3,512	\$ 124,783,211

## Appendix B: Detailed Tabulations of Member Data (continued)

**Table B-5a: Number and Deferred Annual Retirement Allowances of Terminated Vested Members Distributed by Age as of December 31, 2021**

Age	Men		Women	
	Number	Allowances	Number	Allowances
24	1	\$ 2,487	2	\$ 18,221
25	5	15,078		
26	7	29,106	3	8,983
27	15	55,456	25	99,384
28	27	110,804	117	473,318
29	52	236,910	223	985,699
30	86	401,944	348	1,590,487
31	123	599,687	499	2,402,316
32	186	936,970	628	3,144,348
33	233	1,209,732	655	3,496,968
34	221	1,178,030	818	4,341,869
35	277	1,597,220	841	4,730,132
36	310	1,866,612	973	5,497,486
37	387	2,392,808	1,075	6,208,123
38	383	2,452,167	1,225	7,272,851
39	436	2,921,336	1,303	8,329,451
40	464	3,158,576	1,401	9,131,287
41	496	3,625,441	1,375	9,361,007
42	482	3,761,427	1,413	9,646,732
43	504	4,107,549	1,388	10,078,685
44	496	3,883,750	1,346	9,976,624
45	512	4,576,942	1,306	9,905,022
46	544	4,975,194	1,278	9,870,213
47	565	5,211,734	1,361	10,753,095
48	549	5,179,254	1,297	10,426,793
49	579	5,662,834	1,302	10,275,041
50	608	5,850,851	1,347	10,946,793
51	625	5,993,255	1,483	11,236,945
52	629	5,781,955	1,490	11,226,240
53	537	4,787,023	1,436	10,868,639
54	500	4,459,676	1,332	9,596,260
55	515	4,613,287	1,277	9,275,894
56	476	4,209,637	1,226	8,996,177
57	529	4,706,778	1,339	9,814,436
58	508	4,797,046	1,323	9,909,588
59	530	4,641,308	1,319	9,896,207
60	440	3,814,132	1,226	8,494,707
61	350	2,973,722	1,000	6,884,055
62	332	2,922,915	842	5,794,991
63	293	2,320,569	738	5,141,310
64	224	1,840,435	599	3,941,797
65	186	1,378,184	486	3,223,184
66	127	934,761	283	1,703,629
67	79	510,409	265	1,517,278

## Appendix B: Detailed Tabulations of Member Data (continued)

**Table B-5a: Number and Deferred Annual Retirement Allowances of Terminated Vested Members Distributed by Age as of December 31, 2021 (continued)**

Age	Men		Women	
	Number	Allowances	Number	Allowances
68	68	\$ 552,267	206	\$ 1,149,057
69	68	409,997	148	882,102
70	52	446,304	98	586,074
71	36	287,096	76	438,306
72	17	94,713	64	249,693
73	7	18,843	17	184,441
74	10	66,962	24	102,511
75	16	133,483	16	83,487
76	15	81,819	8	49,399
77	8	59,113	9	54,673
78	5	27,312	1	7,656
79	5	60,966	4	9,655
80	2	205,573	8	34,054
81	2	5,892	6	7,929
82	3	7,468	3	76,003
83	4	54,305	3	2,513
84	3	18,848	3	6,065
85	1	1,157	1	2,902
87	2	2,209	1	2,628
88	1	35,566		
92	1	352		
95	1	2,472		
Total	15,755	\$ 129,257,708	41,909	\$ 290,421,413

## Appendix B: Detailed Tabulations of Member Data (continued)

**Table B-5b: Number and Accumulated Contributions of Terminated Non-Vested Members Distributed by Age as of December 31, 2021**

Age	Men		Women	
	Number	Contributions	Number	Contributions
19	6	\$ 2,562	6	\$ 3,124
20	20	17,238	32	32,890
21	44	42,974	62	62,621
22	124	205,325	156	185,247
23	210	372,892	350	545,400
24	327	679,010	682	1,387,742
25	501	1,149,805	1,047	2,621,413
26	669	1,951,867	1,455	4,619,554
27	800	2,616,044	1,918	6,905,259
28	1,011	3,515,850	2,172	8,811,748
29	1,177	3,963,105	2,364	10,639,145
30	1,237	4,881,426	2,653	11,863,928
31	1,315	5,294,496	2,992	13,796,251
32	1,394	5,931,528	3,093	14,591,480
33	1,352	6,057,524	3,100	15,139,217
34	1,365	6,132,321	3,077	15,178,513
35	1,395	6,283,606	2,962	14,941,345
36	1,330	5,915,550	3,093	16,429,586
37	1,405	6,452,389	3,184	16,363,319
38	1,233	5,816,408	3,230	17,129,314
39	1,382	6,678,939	3,186	16,769,958
40	1,317	6,352,267	3,203	17,154,531
41	1,278	6,548,524	3,106	17,255,250
42	1,283	6,325,874	3,143	17,324,099
43	1,200	5,968,544	2,917	16,296,730
44	1,149	6,282,810	2,849	16,448,574
45	1,152	6,568,913	2,715	15,061,725
46	1,016	5,466,424	2,493	14,003,211
47	1,031	5,435,964	2,572	14,027,662
48	1,048	5,826,356	2,312	13,024,048
49	1,055	6,018,109	2,255	12,680,434
50	1,050	5,529,584	2,313	13,196,464
51	1,161	6,508,742	2,432	13,792,339
52	1,014	5,852,824	2,347	12,888,776
53	939	5,581,792	1,979	10,899,365
54	915	5,238,638	1,889	10,468,472
55	855	4,713,305	1,715	9,146,372
56	837	4,615,450	1,646	8,925,425
57	771	4,243,017	1,711	9,120,937
58	751	4,339,126	1,590	8,508,365
59	697	3,837,266	1,515	7,841,402
60	634	3,213,060	1,393	7,432,621
61	617	3,366,112	1,177	6,256,711
62	501	2,778,985	1,028	5,816,800

## Appendix B: Detailed Tabulations of Member Data (continued)

**Table B-5b: Number and Accumulated Contributions of Terminated Non-Vested Members Distributed by Age as of December 31, 2021 (continued)**

Age	Men		Women	
	Number	Contributions	Number	Contributions
63	469	\$ 2,673,465	914	\$ 5,223,156
64	443	2,475,349	845	4,701,179
65	401	2,403,440	687	3,874,102
66	355	2,076,323	571	3,039,030
67	340	2,028,711	565	2,907,496
68	299	1,775,035	472	2,670,005
69	256	1,221,978	440	2,634,109
70	215	1,191,592	333	2,067,584
71	171	810,643	286	1,720,122
72	152	729,701	274	1,356,944
73	76	309,621	106	472,042
74	49	171,434	61	287,245
75	38	111,272	61	252,252
76	22	90,899	39	216,770
77	30	162,929	26	64,395
78	22	69,705	16	102,192
79	13	65,711	13	89,253
80	12	31,631	12	40,440
81	9	29,034	8	70,122
82	10	29,110	7	11,252
83	10	55,723	4	1,344
84	3	23,074	7	33,595
85	6	36,008	5	17,044
86	3	6,614	4	21,426
87	7	15,447	4	5,497
88	4	3,352	3	484
89	3	24,273	1	252
90	2	933	2	155
91	1	5,242	3	1,152
92	1	209		
93	2	6,395	1	387
94	1			
95			2	6,055
96	2	53	2	234
97			2	54
98	1	2,078	2	26
99			1	87
100			3	916
101	1	149	1	345
102			1	250
103			1	57
104	1	1,393	1	14
109			1	5
121	51	45,060	27	33,217
122			1	515
Total	44,049	\$ 213,256,131	96,929	\$ 497,510,168

## Appendix B: Detailed Tabulations of Member Data (continued)

**Table B-6: Number and Annual Retirement Allowances of Retired Members (Healthy at Retirement) and Survivors of Deceased Members Distributed by Age as of December 31, 2021**

Age	Men		Women	
	Number	Allowances	Number	Allowances
<20	8	\$ 72,983	2	\$ 22,201
20				
21			3	45,669
22	1	7,712	1	8,875
23	7	41,875	2	16,779
24	5	85,609	6	43,160
25	7	33,788	3	21,534
26	7	95,148	5	86,965
27	3	33,093	5	61,173
28	6	69,343	2	46,194
29	2	15,467	13	185,859
30	9	120,626	10	89,647
31	8	90,995	9	106,392
32	10	113,292	16	181,723
33	16	111,008	10	108,397
34	12	181,660	16	190,107
35	12	115,894	19	199,346
36	10	77,498	19	186,078
37	11	145,231	13	170,807
38	20	186,033	16	131,996
39	15	186,606	23	275,169
40	25	246,033	27	338,070
41	25	377,041	27	259,958
42	17	219,508	22	1,649,223
43	21	219,998	24	307,148
44	19	214,725	35	421,434
45	26	339,727	40	443,662
46	23	289,986	42	546,615
47	32	636,544	36	419,051
48	39	575,676	37	415,179
49	44	811,860	57	744,903
50	136	3,813,426	103	1,508,025
51	236	6,527,372	288	5,914,999
52	315	9,218,839	459	11,562,476
53	398	11,762,860	716	19,536,383
54	486	15,239,161	802	22,252,777
55	595	18,533,272	980	27,036,405
56	665	20,970,596	1,144	32,670,709
57	773	24,277,087	1,419	40,544,694
58	905	27,897,411	1,577	44,529,041
59	1,034	32,905,611	1,802	51,562,383
60	1,118	34,347,498	2,250	61,490,715
61	1,395	39,762,969	3,182	80,034,235
62	1,531	40,641,808	3,767	87,465,107
63	1,891	45,025,509	4,472	90,219,322

## Appendix B: Detailed Tabulations of Member Data (continued)

**Table B-6: Number and Annual Retirement Allowances of Retired Members (Healthy at Retirement) and Survivors of Deceased Members Distributed by Age as of December 31, 2021 (continued)**

Age	Men		Women	
	Number	Allowances	Number	Allowances
64	2,051	\$ 48,240,672	5,278	\$ 110,726,765
65	2,324	52,660,171	6,053	125,524,210
66	2,626	58,351,511	6,623	135,151,473
67	2,914	64,675,733	7,224	146,675,329
68	2,985	65,892,399	7,734	156,673,393
69	3,134	71,654,566	7,979	164,579,702
70	3,248	73,785,227	7,882	162,307,439
71	3,261	73,240,754	7,578	156,056,044
72	3,178	72,909,993	7,338	146,829,789
73	3,231	74,356,878	7,208	142,043,748
74	3,236	74,691,517	7,053	137,028,840
75	3,447	81,366,373	7,453	144,633,994
76	2,361	54,662,494	5,071	95,690,364
77	2,316	53,122,313	4,688	87,128,430
78	2,037	47,379,799	4,617	86,266,773
79	2,054	50,755,988	4,562	84,308,315
80	1,631	38,910,394	3,673	66,307,793
81	1,458	34,785,122	3,272	58,868,859
82	1,280	31,319,811	2,978	53,046,642
83	1,194	29,053,548	2,666	47,048,753
84	1,048	25,403,175	2,512	43,022,495
85	875	22,554,660	2,127	37,196,316
86	822	20,729,413	2,059	35,435,671
87	677	16,986,717	1,966	33,416,393
88	588	14,967,089	1,493	24,053,585
89	494	12,058,487	1,350	22,209,706
90	440	10,831,947	1,226	20,298,592
91	340	8,930,221	1,018	17,447,983
92	293	7,748,488	857	14,518,755
93	203	5,330,211	703	11,237,133
94	145	3,474,332	559	9,118,137
95	120	3,014,140	416	6,573,138
96	86	2,010,369	340	4,968,253
97	42	823,395	228	3,296,989
98	30	528,762	180	2,667,846
99	18	344,713	111	1,419,342
100+	40	1,042,277	213	3,069,699
Total	68,145	\$ 1,645,232,037	157,789	\$ 3,180,897,273

## Appendix B: Detailed Tabulations of Member Data (continued)

**Table B-7: Number and Annual Retirement Allowances of Retired Members (Healthy at Retirement) and Survivors of Deceased Members Distributed by Annuity Type as of December 31, 2021**

Annuity Type	Men		Women	
	Number	Allowances	Number	Allowances
Maximum	23,270	\$ 543,486,976	85,964	\$ 1,707,565,584
Option 1	392	11,943,623	1,565	27,979,435
Option 2	12,982	310,436,495	9,094	153,484,316
Option 3	3,429	101,099,569	3,926	82,703,371
Option 4	8,822	216,540,784	23,911	530,830,209
Option 5-2	74	2,290,782	36	367,138
Option 5-3	50	1,676,791	46	902,311
Option 6-2	10,819	275,306,123	12,466	264,550,479
Option 6-3	4,163	127,771,686	8,165	208,278,447
Other	4	1,413,129	2	579,987
Survivors of Deceased Members	4,140	53,266,079	12,614	203,655,996
<b>Total</b>	<b>68,145</b>	<b>\$ 1,645,232,037</b>	<b>157,789</b>	<b>\$ 3,180,897,273</b>

## Appendix B: Detailed Tabulations of Member Data (continued)

**Table B-8: Number and Annual Retirement Allowances of Retired Members (Disabled at Retirement) Distributed by Age as of December 31, 2021**

Age	Men		Women	
	Number	Allowances	Number	Allowances
49			1	\$ 16,424
50			1	12,671
51	4	\$ 88,669	2	35,472
52	6	118,215	7	142,354
53	12	262,479	12	237,442
54	14	312,211	19	405,786
55	24	541,453	23	578,972
56	23	448,777	28	650,403
57	32	710,517	46	1,039,623
58	36	815,363	48	1,023,238
59	40	869,751	67	1,423,846
60	61	1,116,294	114	2,211,581
61	68	1,368,918	195	3,642,247
62	82	1,723,271	159	3,017,977
63	99	1,815,309	194	3,529,222
64	115	2,270,914	203	3,997,067
65	148	2,557,345	292	4,780,810
66	197	3,268,209	461	7,629,017
67	193	3,207,366	452	7,445,114
68	197	3,384,365	504	8,572,727
69	220	3,769,497	515	9,240,606
70	228	4,045,738	557	10,007,237
71	222	3,881,636	590	10,380,325
72	232	3,880,708	503	8,729,082
73	213	3,720,004	475	8,579,614
74	269	4,943,934	484	8,347,692
75	230	4,304,029	485	8,360,903

## Appendix B: Detailed Tabulations of Member Data (continued)

**Table B-8: Number and Annual Retirement Allowances of Retired Members (Disabled at Retirement) Distributed by Age as of December 31, 2021 (continued)**

Age	Men		Women	
	Number	Allowances	Number	Allowances
76	155	\$ 2,764,025	345	\$ 5,737,430
77	126	2,212,034	336	5,352,641
78	116	1,896,222	308	4,599,132
79	116	2,010,410	294	4,715,130
80	87	1,560,490	216	3,378,254
81	66	988,463	179	2,414,351
82	79	1,246,180	127	1,880,663
83	44	593,487	146	1,863,943
84	35	595,343	131	1,708,867
85	25	344,038	70	1,005,667
86	16	307,304	50	665,364
87	11	195,345	32	413,817
88	10	169,869	36	515,899
89	7	195,536	22	248,596
90	13	221,306	17	214,132
91	10	94,372	18	206,800
92	2	29,166	17	240,316
93	2	16,010	14	179,629
94	1	10,041	10	123,124
95	1	7,677	6	95,152
96			8	109,221
97			1	6,606
98			7	57,994
99			2	24,676
100	1	6,805		
101			1	3,783
Total	3,888	\$ 68,889,095	8,830	\$ 149,798,639

## Appendix B: Detailed Tabulations of Member Data (continued)

**Table B-9: Number and Annual Retirement Allowances of Retired Members (Disabled at Retirement) Distributed by Annuity Type as of December 31, 2021 (continued)**

Annuity Type	Men		Women	
	Number	Allowances	Number	Allowances
Maximum	1,911	\$ 36,256,720	6,185	\$ 107,945,962
Option 1	41	820,425	168	2,551,475
Option 2	803	11,392,494	744	10,124,177
Option 3	189	3,553,985	284	4,487,343
Option 4	136	2,973,832	396	7,110,520
Option 5-2	1	20,506	1	8,214
Option 5-3				
Option 6-2	599	9,592,762	655	10,164,642
Option 6-3	208	4,278,371	396	7,385,344
Other			1	20,962
Total	3,888	\$ 68,889,095	8,830	\$ 149,798,639

## Appendix B: Detailed Tabulations of Member Data (continued)

**Table B-10: Number and Annual Retirement Allowances of Retired Members and Survivors of Deceased Members Distributed by Amount of Annual Retirement Allowance as of December 31, 2021**

Amount of Annual Retirement Allowances	Number of Retired Members and Survivors	Sum of Annual Retirement Allowances
\$0 - \$ 4,999	30,841	\$ 93,405,936
\$5,000 - \$9,999	39,390	292,591,621
\$10,000 - \$14,999	33,307	414,496,108
\$15,000 - \$19,999	26,334	458,053,614
\$20,000 - \$24,999	23,253	523,901,186
\$25,000 - \$29,999	22,896	628,930,027
\$30,000 - \$34,999	21,663	702,023,743
\$35,000 - \$39,999	15,263	569,761,559
\$40,000 - \$ 44,999	9,412	397,999,955
\$45,000 - \$49,999	5,591	264,205,080
\$50,000 & over	10,702	699,448,217
Total	238,652	\$ 5,044,817,045

## **Appendix C: 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 C: 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 C: 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 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  $\frac{1}{120}$  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 C: 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 C: 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

The December 31, 2021 valuation reflects a one-time supplement for TSERS payees that is equal to 4% of their annual allowance and payable in October 2022.

## Appendix D: 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								
Service	General Employees		Teachers, Librarians, and Counselors		Law Enforcement Officers		Other Education	
	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								
Service	General Employees		Teachers, Librarians, and Counselors		Law Enforcement Officers		Other Education	
	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 D: Actuarial Assumptions and Methods (continued)

### Annual Rates of Mortality for Employees

(Base rates using Pub-2010 Amount weighted)

Service	General Employees		Teachers, Librarians, and Counselors		Law Enforcement Officers		Other Education	
	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

Service	General Employees		Teachers, Librarians, and Counselors		Law Enforcement Officers		Other Education	
	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 D: 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 D: Actuarial Assumptions and Methods (continued)

### Law Enforcement Officers

Age	Service						
	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 Age	Service						
	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 Age	Service						
	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 D: 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)

Service	General Employees		Teachers, Librarians, and Counselors		Law Enforcement Officers		Other Education	
	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 (members healthy at retirement)

Age	Contingent Survivors of Deceased members		Members Disabled at Retirement			
	All Survivors		Non - Law Enforcement Officers		Law Enforcement Officers	
	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 D: 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 D: 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 D: 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 8. 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)<sub>i</sub> = the asset gain or (loss) for the i-th year preceding the valuation date

### Changes in Assumptions and Methods Since Prior Valuation:

The assumptions and methods used for the December 31, 2021 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.

Since the prior valuation, a transition from the prior actuary to Buck resulted in valuation programming modifications and differences in methodology. The net impact of the overall transition changes increased the actuarial accrued liability by \$149.9 million, as of December 31, 2021, or 0.16% of the expected actuarial accrued liability.

# Appendix E: GASB 67 Fiduciary Net Position Projection

**Table E-1: Projection of Fiduciary Net Positions (in thousands)**

Calendar Year	Beginning Fiduciary Position	Member Contributions	Employer Contributions	Benefit Payments	Administrative Expenses	Investment Earnings	Ending Fiduciary Position
2022	\$ 87,966,353	\$ 933,106	\$ 2,575,373	\$ 5,723,474	\$ 15,305	\$ (5,764,887)	\$ 79,971,166
2023	79,971,166	882,972	2,550,463	5,701,016	14,483	5,125,126	82,814,228
2024	82,814,228	836,047	2,429,547	5,865,051	14,533	5,299,307	85,499,545
2025	85,499,545	793,687	2,425,996	6,029,349	14,723	5,467,123	88,142,279
2026	88,142,279	753,911	2,432,390	6,201,974	14,949	5,632,302	90,743,959
2027	90,743,959	715,573	2,607,183	6,381,681	15,196	5,800,021	93,469,859
2028	93,469,859	678,069	3,067,708	6,573,242	15,421	5,984,601	96,611,574
2029	96,611,574	640,520	3,162,080	6,771,454	15,626	6,184,283	99,811,377
2030	99,811,377	603,045	2,767,823	6,970,329	15,807	6,372,092	102,568,201
2031	102,568,201	565,789	2,265,356	7,167,065	15,969	6,527,723	104,744,035
2032	104,744,035	528,770	1,679,453	7,358,968	16,106	6,643,082	106,220,266
2033	106,220,266	492,037	1,246,633	7,545,602	16,218	6,718,044	107,115,160
2034	107,115,160	455,794	918,804	7,725,646	16,302	6,758,804	107,506,614
2035	107,506,614	420,265	1,009,332	7,896,008	16,361	6,780,557	107,804,399
2036	107,804,399	385,631	1,176,836	8,054,481	16,384	6,799,092	108,095,093
2037	108,095,093	352,205	950,084	8,199,285	16,377	6,805,034	107,986,754
2038	107,986,754	321,094	636,034	8,320,419	16,339	6,783,078	107,390,202
2039	107,390,202	292,346	425,607	8,418,165	16,267	6,733,525	106,407,248
2040	106,407,248	264,384	281,789	8,507,905	16,164	6,661,270	105,090,622
2041	105,090,622	236,827	236,827	8,590,095	16,028	6,570,746	103,528,899
2042	103,528,899	209,510	209,510	8,653,513	15,864	6,465,462	101,744,004
2043	101,744,004	182,686	182,686	8,693,404	15,675	6,346,459	99,746,756
2044	99,746,756	157,024	157,024	8,716,546	15,458	6,214,262	97,543,062
2045	97,543,062	132,857	132,857	8,721,362	15,215	6,069,330	95,141,529
2046	95,141,529	110,275	110,275	8,706,424	14,949	5,912,271	92,552,977
2047	92,552,977	89,675	89,675	8,668,014	14,658	5,743,937	89,793,592
2048	89,793,592	71,243	71,243	8,604,855	14,340	5,565,428	86,882,311
2049	86,882,311	54,778	54,778	8,518,212	13,999	5,377,923	83,837,579
2050	83,837,579	40,164	40,164	8,408,169	13,638	5,182,612	80,678,712
2051	80,678,712	27,381	27,381	8,275,939	13,267	4,980,709	77,424,977
2052	77,424,977	17,937	17,937	8,108,309	12,887	4,773,987	74,113,642
2053	74,113,642	12,132	12,132	7,903,757	12,500	4,564,935	70,786,584
2054	70,786,584	8,317	8,317	7,678,039	12,112	4,355,665	67,468,732
2055	67,468,732	5,716	5,716	7,439,004	11,729	4,147,496	64,176,927
2056	64,176,927	3,933	3,933	7,190,637	11,349	3,941,372	60,924,179
2057	60,924,179	2,700	2,700	6,935,929	10,974	3,738,024	57,720,700
2058	57,720,700	1,848	1,848	6,676,863	10,612	3,538,042	54,574,963
2059	54,574,963	1,261	1,261	6,414,854	10,279	3,341,923	51,494,275
2060	51,494,275	853	853	6,151,050	9,956	3,150,103	48,485,078
2061	48,485,078	574	574	5,886,718	9,636	2,962,952	45,552,824
2062	45,552,824	381	381	5,460,714	9,313	2,785,981	42,869,540
2063	42,869,540	249	249	5,203,823	8,986	2,619,787	40,277,016
2064	40,277,016	160	160	4,948,193	8,653	2,459,455	37,779,945
2065	37,779,945	100	100	4,694,395	8,315	2,305,270	35,382,705
2066	35,382,705	61	61	4,442,982	7,972	2,157,500	33,089,373
2067	33,089,373	36	36	4,194,512	7,625	2,016,392	30,903,700
2068	30,903,700	21	21	3,949,563	7,275	1,882,168	28,829,072
2069	28,829,072	11	11	3,708,726	6,923	1,755,033	26,868,478
2070	26,868,478	6	6	3,472,599	6,569	1,635,158	25,024,480
2071	25,024,480	3	3	3,241,762	6,215	1,522,693	23,299,202

## Appendix E: GASB 67 Fiduciary Net Position Projection (continued)

Table E-1: Projection of Fiduciary Net Positions (in thousands) (continued)

Calendar Year	Beginning Fiduciary Position	Member Contributions	Employer Contributions	Benefit Payments	Administrative Expenses	Investment Earnings	Ending Fiduciary Position
2072	\$ 23,299,202	\$ 1	\$ 1	\$ 3,016,780	\$ 5,862	\$ 1,417,760	\$ 21,694,322
2073	21,694,322	0	0	2,798,180	5,510	1,320,446	20,211,078
2074	20,211,078	0	0	2,586,451	5,162	1,230,819	18,850,284
2075	18,850,284	0	0	2,382,046	4,818	1,148,916	17,612,336
2076	17,612,336	0	0	2,185,372	4,480	1,074,751	16,497,235
2077	16,497,235	0	0	1,996,799	4,149	1,008,314	15,504,601
2078	15,504,601	0	0	1,816,658	3,825	949,565	14,633,683
2079	14,633,683	0	0	1,645,242	3,511	898,449	13,883,379
2080	13,883,379	0	0	1,482,811	3,206	854,884	13,252,246
2081	13,252,246	0	0	1,329,583	2,913	818,771	12,738,521
2082	12,738,521	0	0	1,185,729	2,633	789,990	12,340,149
2083	12,340,149	0	0	1,051,367	2,366	768,403	12,054,819
2084	12,054,819	0	0	926,550	2,113	753,856	11,880,012
2085	11,880,012	0	0	811,268	1,875	746,189	11,813,058
2086	11,813,058	0	0	705,440	1,653	745,230	11,851,195
2087	11,851,195	0	0	608,917	1,447	750,803	11,991,634
2088	11,991,634	0	0	521,485	1,257	762,735	12,231,627
2089	12,231,627	0	0	442,874	1,083	780,853	12,568,523
2090	12,568,523	0	0	372,755	926	805,000	12,999,842
2091	12,999,842	0	0	310,743	784	835,024	13,523,339
2092	13,523,339	0	0	256,400	658	870,794	14,137,075
2093	14,137,075	0	0	209,242	547	912,199	14,839,485
2094	14,839,485	0	0	168,748	450	959,155	15,629,442
2095	15,629,442	0	0	134,369	366	1,011,603	16,506,310
2096	16,506,310	0	0	105,544	295	1,069,525	17,469,996
2097	17,469,996	0	0	81,704	235	1,132,929	18,520,986
2098	18,520,986	0	0	62,279	185	1,201,866	19,660,388
2099	19,660,388	0	0	46,703	144	1,276,427	20,889,968
2100	20,889,968	0	0	34,425	111	1,356,743	22,212,175
2101	22,212,175	0	0	24,923	85	1,442,991	23,630,158
2102	23,630,158	0	0	17,714	65	1,535,392	25,147,771
2103	25,147,771	0	0	12,358	49	1,634,208	26,769,572
2104	26,769,572	0	0	8,466	37	1,739,750	28,500,819
2105	28,500,819	0	0	5,702	29	1,852,370	30,347,458
2106	30,347,458	0	0	3,786	22	1,972,464	32,316,114
2107	32,316,114	0	0	2,489	17	2,100,466	34,414,074
2108	34,414,074	0	0	1,632	14	2,236,863	36,649,291
2109	36,649,291	0	0	1,076	11	2,382,169	39,030,373
2110	39,030,373	0	0	721	9	2,536,951	41,566,594
2111	41,566,594	0	0	497	8	2,701,813	44,267,902
2112	44,267,902	0	0	353	6	2,877,402	47,144,945
2113	47,144,945	0	0	259	5	3,064,413	50,209,094
2114	50,209,094	0	0	195	4	3,263,585	53,472,480
2115	53,472,480	0	0	149	3	3,475,706	56,948,034
2116	56,948,034	0	0	115	3	3,701,618	60,649,534
2117	60,649,534	0	0	89	2	3,942,217	64,591,660
2118	64,591,660	0	0	68	2	4,198,455	68,790,045
2119	68,790,045	0	0	52	1	4,471,351	73,261,343
2120	73,261,343	0	0	39	1	4,761,986	78,023,289
2121	78,023,289	0	0	29	1	5,071,513	83,094,772

# Appendix E: GASB 67 Fiduciary Net Position Projection (continued)

**Table E-2: Actuarial Present Value of Projected Benefit Payments (in thousands)**

Calendar Year	Beginning Fiduciary Position	Benefit Payments	Funded Benefit Payments	Unfunded Benefit Payments	Present Value of Benefit Payments		
					Funded Payments at 6.50%	Unfunded Payments at 3.54%	Using Single Discount Rate of 6.50%
2022	\$ 87,966,353	\$ 5,723,474	\$ 5,723,474	\$ 0	\$ 5,546,064	\$ 0	\$ 5,546,064
2023	79,971,166	5,701,016	5,701,016	0	5,187,139	0	5,187,139
2024	82,814,228	5,865,051	5,865,051	0	5,010,693	0	5,010,693
2025	85,499,545	6,029,349	6,029,349	0	4,836,674	0	4,836,674
2026	88,142,279	6,201,974	6,201,974	0	4,671,504	0	4,671,504
2027	90,743,959	6,381,681	6,381,681	0	4,513,488	0	4,513,488
2028	93,469,859	6,573,242	6,573,242	0	4,365,230	0	4,365,230
2029	96,611,574	6,771,454	6,771,454	0	4,222,405	0	4,222,405
2030	99,811,377	6,970,329	6,970,329	0	4,081,141	0	4,081,141
2031	102,568,201	7,167,065	7,167,065	0	3,940,216	0	3,940,216
2032	104,744,035	7,358,968	7,358,968	0	3,798,797	0	3,798,797
2033	106,220,266	7,545,602	7,545,602	0	3,657,408	0	3,657,408
2034	107,115,160	7,725,646	7,725,646	0	3,516,128	0	3,516,128
2035	107,506,614	7,896,008	7,896,008	0	3,374,332	0	3,374,332
2036	107,804,399	8,054,481	8,054,481	0	3,231,977	0	3,231,977
2037	108,095,093	8,199,285	8,199,285	0	3,089,278	0	3,089,278
2038	107,986,754	8,320,419	8,320,419	0	2,943,586	0	2,943,586
2039	107,390,202	8,418,165	8,418,165	0	2,796,400	0	2,796,400
2040	106,407,248	8,507,905	8,507,905	0	2,653,719	0	2,653,719
2041	105,090,622	8,590,095	8,590,095	0	2,515,826	0	2,515,826
2042	103,528,899	8,653,513	8,653,513	0	2,379,718	0	2,379,718
2043	101,744,004	8,693,404	8,693,404	0	2,244,777	0	2,244,777
2044	99,746,756	8,716,546	8,716,546	0	2,113,383	0	2,113,383
2045	97,543,062	8,721,362	8,721,362	0	1,985,494	0	1,985,494
2046	95,141,529	8,706,424	8,706,424	0	1,861,120	0	1,861,120
2047	92,552,977	8,668,014	8,668,014	0	1,739,821	0	1,739,821
2048	89,793,592	8,604,855	8,604,855	0	1,621,731	0	1,621,731
2049	86,882,311	8,518,212	8,518,212	0	1,507,420	0	1,507,420
2050	83,837,579	8,408,169	8,408,169	0	1,397,133	0	1,397,133
2051	80,678,712	8,275,939	8,275,939	0	1,291,231	0	1,291,231
2052	77,424,977	8,108,309	8,108,309	0	1,187,865	0	1,187,865
2053	74,113,642	7,903,757	7,903,757	0	1,087,229	0	1,087,229
2054	70,786,584	7,678,039	7,678,039	0	991,718	0	991,718
2055	67,468,732	7,439,004	7,439,004	0	902,200	0	902,200
2056	64,176,927	7,190,637	7,190,637	0	818,853	0	818,853
2057	60,924,179	6,935,929	6,935,929	0	741,641	0	741,641
2058	57,720,700	6,676,863	6,676,863	0	670,366	0	670,366
2059	54,574,963	6,414,854	6,414,854	0	604,751	0	604,751
2060	51,494,275	6,151,050	6,151,050	0	544,489	0	544,489
2061	48,485,078	5,886,718	5,886,718	0	489,287	0	489,287
2062	45,552,824	5,460,714	5,460,714	0	426,177	0	426,177
2063	42,869,540	5,203,823	5,203,823	0	381,341	0	381,341
2064	40,277,016	4,948,193	4,948,193	0	340,477	0	340,477
2065	37,779,945	4,694,395	4,694,395	0	303,299	0	303,299
2066	35,382,705	4,442,982	4,442,982	0	269,536	0	269,536
2067	33,089,373	4,194,512	4,194,512	0	238,932	0	238,932
2068	30,903,700	3,949,563	3,949,563	0	211,248	0	211,248
2069	28,829,072	3,708,726	3,708,726	0	186,259	0	186,259
2070	26,868,478	3,472,599	3,472,599	0	163,757	0	163,757
2071	25,024,480	3,241,762	3,241,762	0	143,541	0	143,541

## Appendix E: GASB 67 Fiduciary Net Position Projection (continued)

**Table E-2: Actuarial Present Value of Projected Benefit Payments (in thousands)**  
(continued)

Calendar Year	Beginning Fiduciary Position	Benefit Payments	Funded Benefit Payments	Unfunded Benefit Payments	Present Value of Benefit Payments		
					Funded Payments at 6.50%	Unfunded Payments at 3.54%	Using Single Discount Rate of 6.50%
2072	\$ 23,299,202	\$ 3,016,780	\$ 3,016,780	\$ 0	\$ 125,426	\$ 0	\$ 125,426
2073	21,694,322	2,798,180	2,798,180	0	109,237	0	109,237
2074	20,211,078	2,586,451	2,586,451	0	94,809	0	94,809
2075	18,850,284	2,382,046	2,382,046	0	81,987	0	81,987
2076	17,612,336	2,185,372	2,185,372	0	70,627	0	70,627
2077	16,497,235	1,996,799	1,996,799	0	60,594	0	60,594
2078	15,504,601	1,816,658	1,816,658	0	51,763	0	51,763
2079	14,633,683	1,645,242	1,645,242	0	44,018	0	44,018
2080	13,883,379	1,482,811	1,482,811	0	37,251	0	37,251
2081	13,252,246	1,329,583	1,329,583	0	31,363	0	31,363
2082	12,738,521	1,185,729	1,185,729	0	26,262	0	26,262
2083	12,340,149	1,051,367	1,051,367	0	21,865	0	21,865
2084	12,054,819	926,550	926,550	0	18,093	0	18,093
2085	11,880,012	811,268	811,268	0	14,875	0	14,875
2086	11,813,058	705,440	705,440	0	12,145	0	12,145
2087	11,851,195	608,917	608,917	0	9,844	0	9,844
2088	11,991,634	521,485	521,485	0	7,916	0	7,916
2089	12,231,627	442,874	442,874	0	6,312	0	6,312
2090	12,568,523	372,755	372,755	0	4,989	0	4,989
2091	12,999,842	310,743	310,743	0	3,905	0	3,905
2092	13,523,339	256,400	256,400	0	3,025	0	3,025
2093	14,137,075	209,242	209,242	0	2,318	0	2,318
2094	14,839,485	168,748	168,748	0	1,755	0	1,755
2095	15,629,442	134,369	134,369	0	1,313	0	1,313
2096	16,506,310	105,544	105,544	0	968	0	968
2097	17,469,996	81,704	81,704	0	704	0	704
2098	18,520,986	62,279	62,279	0	504	0	504
2099	19,660,388	46,703	46,703	0	355	0	355
2100	20,889,968	34,425	34,425	0	245	0	245
2101	22,212,175	24,923	24,923	0	167	0	167
2102	23,630,158	17,714	17,714	0	111	0	111
2103	25,147,771	12,358	12,358	0	73	0	73
2104	26,769,572	8,466	8,466	0	47	0	47
2105	28,500,819	5,702	5,702	0	30	0	30
2106	30,347,458	3,786	3,786	0	18	0	18
2107	32,316,114	2,489	2,489	0	11	0	11
2108	34,414,074	1,632	1,632	0	7	0	7
2109	36,649,291	1,076	1,076	0	4	0	4
2110	39,030,373	721	721	0	3	0	3
2111	41,566,594	497	497	0	2	0	2
2112	44,267,902	353	353	0	1	0	1
2113	47,144,945	259	259	0	1	0	1
2114	50,209,094	195	195	0	1	0	1
2115	53,472,480	149	149	0	0	0	0
2116	56,948,034	115	115	0	0	0	0
2117	60,649,534	89	89	0	0	0	0
2118	64,591,660	68	68	0	0	0	0
2119	68,790,045	52	52	0	0	0	0
2120	73,261,343	39	39	0	0	0	0
2121	78,023,289	29	29	0	0	0	0

## Appendix F: Additional Disclosures

Table F-1 illustrates the sensitivity of certain valuation results to changes in the discount rate on a market value of assets basis. Table F-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 1.90% at December 31, 2021 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 (1.90%) was used to establish an upper bound for sensitivity analysis (11.10%). Based on the DST Investment Management Division’s analysis, the lower bound of 1.90% returns is at least 95% likely to be achieved on average over the next 30 years, while the upper bound of 11.10% is less than 5% likely to be achieved on average over the next 30 years.

**Table F-1: Sensitivity of Valuation Results as of December 31, 2021**

Discount Rate	1.90%	4.20%	6.50%	8.80%	11.10%
Market Value of Assets	\$ 87,966,352,518	\$ 87,966,352,518	\$ 87,966,352,518	\$ 87,966,352,518	\$ 87,966,352,518
Actuarial Accrued Liability	\$ 170,072,145,195	\$ 122,144,923,824	\$ 92,356,225,906	\$ 73,153,205,953	\$ 60,133,177,684
Unfunded Accrued Liability (UAL)	\$ 82,105,792,677	\$ 34,178,571,306	\$ 4,389,873,388	\$ (14,813,146,565)	\$ (27,833,174,834)
Funded Ratio	51.7%	72.0%	95.2%	120.2%	146.3%
20-Year Amortization of UAL (as % of general state revenue)	\$ 5,067,478,353 12.3%	\$ 2,667,157,199 6.5%	\$ 424,302,730 1.0%	N/A N/A	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 F-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 F-2: Statistical Likelihood of Minimum Future Asset Returns as of 12/31/2021**

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 to the Investment Advisory Committee on February 23, 2022.

## Appendix G: Data for Section 2 Graphs

The tables below provide the numbers associated with the graphs in Section 2 of this report.

**Graph 1: Active Members**

	<b>Active Member Count</b>	<b>Reported Compensation</b>
2017	304,554	\$ 13,914,085,325
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

**Graph 2: Retired Members and Survivors of Deceased Members**

	<b>Retired and Survivors of Deceased Member Count</b>	<b>Retirement Allowance</b>
2017	215,008	\$ 4,521,393,822
2018	222,084	4,668,925,869
2019	228,291	4,804,178,473
2020	233,751	4,927,686,580
2021	238,652	5,044,817,045

**Graph 3: Market Value of Assets and Asset Returns**

	<b>Market Value of Assets</b>	<b>Asset Return</b>
2017	\$ 70,607,887,248	13.49%
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%

## Appendix G: Data for Section 2 Graphs (continued)

Graph 5: Cost-of-Living Increase and CPI-U History

	Total Allowance Increase*	National CPI-U
1990	0.0%	6.1%
1991	5.2%	3.1%
1992	2.2%	2.9%
1993	4.7%	2.7%
1994	3.2%	2.7%
1995	4.4%	2.5%
1996	6.2%	3.3%
1997	2.5%	1.7%
1998	2.3%	1.6%
1999	4.2%	2.7%
2000	2.0%	3.4%
2001	2.0%	1.6%
2002	1.3%	2.4%
2003	1.7%	1.9%
2004	2.0%	3.3%
2005	3.0%	3.4%
2006	2.2%	2.5%
2007	2.2%	4.1%
2008	0.0%	0.1%
2009	0.0%	2.7%
2010	0.0%	1.5%
2011	1.0%	3.0%
2012	0.0%	1.7%
2013	1.0%	1.5%
2014	0.0%	0.8%
2015	0.0%	0.7%
2016	1.0%	2.1%
2017	0.0%	2.1%
2018	0.0%	1.9%
2019	0.0%	2.3%
2020	0.0%	1.4%
2021	0.0%	7.0%

\* Allowance increases are effective at July 1 the following year.

## Appendix G: Data for Section 2 Graphs (continued)

**Graph 6: Actuarial Value and Market Value of Assets**

	<b>Actuarial Value of Assets</b>	<b>Market Value of Assets</b>
2017	\$ 69,568,450,606	\$ 70,607,887,248
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

**Graph 7: Asset Returns**

	<b>Actuarial Value</b>	<b>Market Value</b>
2017	6.56%	13.49%
2018	5.10%	-1.39%
2019	6.18%	14.85%
2020	8.80%	11.12%
2021	9.18%	9.68%

**Graph 8: Actuarial Accrued Liability**

	<b>Liability for Active Members</b>	<b>Liability for Deferred Members</b>	<b>Liability for Retired Members</b>	<b>Total Liability</b>
2017	\$ 30,943,761,739	\$ 4,053,311,655	\$ 44,212,274,274	\$ 79,209,347,668
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

**Graph 9: Actuarial Accrued Liability and Actuarial Value of Assets**

	<b>Actuarial Accrued Liability</b>	<b>Actuarial Value of Assets</b>
2017	\$ 79,209,347,668	\$ 69,568,450,606
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

## Appendix G: Data for Section 2 Graphs (continued)

**Graph 10: Funded Ratios**

	Funded Ratio (Actuarial Basis)	Funded Ratio (Market Value Basis)
2017	87.8%	89.1%
2018	86.4%	82.3%
2019	86.4%	88.9%
2020	86.8%	91.3%
2021	90.0%	95.2%

**Graph 11: Actuarially Determined Employer Contribution Rates**

Fiscal Year Ending	Normal Rate	Accrued Liability Rate	Total Rate
2019	5.17%	7.80%	12.97%
2020	5.18%	9.60%	14.78%
2021	5.16%	10.58%	15.74%
2022	6.39%	8.74%	15.13%
2023*	6.33%	6.06%	12.39%

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

**Graph 12: Projected Actuarially Determined Employer Contribution Rates**

	Alternate #1 (0.0% 2022 Return)	Baseline Projection	Alternate #2 (-6.5% 2022 Return)
2024	12.39%	12.39%	12.39%
2025	12.46%	11.62%	13.30%
2026	11.28%	9.41%	13.14%
2027	11.35%	8.50%	14.20%
2028	11.23%	7.37%	15.09%
2029	11.29%	6.38%	16.19%
2030	8.94%	6.00%	13.92%
2031	7.48%	6.00%	12.35%
2032	6.00%	6.00%	10.48%
2033	6.00%	6.00%	9.15%
2034	6.00%	6.00%	8.48%
2035	6.00%	6.00%	7.68%
2036	6.00%	6.00%	8.59%
2037	6.00%	6.00%	7.99%
2038	6.00%	6.00%	7.85%
2039	6.00%	6.00%	7.27%

## Appendix G: Data for Section 2 Graphs (continued)

Graph 13: Projected Funded Ratio

	<b>Alternate #1 (0.0% 2022 Return)</b>	<b>Baseline Projection</b>	<b>Alternate #2 (-6.50% 2022 Return)</b>
2021	90.0%	90.0%	90.0%
2022	91.8%	93.0%	90.6%
2023	94.6%	97.4%	91.9%
2024	96.3%	100.5%	92.1%
2025	97.5%	103.2%	91.9%
2026	98.4%	105.4%	91.4%
2027	99.9%	106.9%	92.9%
2028	100.9%	107.4%	94.4%
2029	101.8%	107.8%	95.9%
2030	102.3%	108.2%	97.1%
2031	102.6%	108.6%	98.0%
2032	102.7%	109.0%	98.6%
2033	102.9%	109.4%	99.1%
2034	103.0%	109.9%	99.4%
2035	103.2%	110.3%	99.8%
2036	103.3%	110.8%	100.3%

## Appendix H: 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 Commerce	12510
Caldwell County Schools	31400	Department Of Justice	10400
Camden County Schools	31500	Department Of Natural And Cultural Resources	10700
Cape Fear Community College	36505	Department Of Public Instruction	22000
Cape Fear Ctr For Inquiry	36501	Department Of Public Safety	19100
Carolina International School	31301	Dept Of Agriculture & Consumer Svcs.	18400
Carteret Community College	31605	Discovery Charter	32904

## Appendix H: Participating Employers (continued)

Employer	Employer Code	Employer	Employer Code
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
Hertford County Schools	34600	Mountain Community School	34501

## Appendix H: Participating Employers (continued)

Employer	Employer Code	Employer	Employer Code
Mtn Discovery Charter	38701	Randolph Community College	37605
N.E. Academy Of Aerospace & Adv.Tech	37001	Randolph County Schools	37600
N.E. Regional School For Biotechnology	33001	Revenue Department	13500
Nash Community College	36405	Richmond County Schools	37700
Nash County Public Schools	36400	Richmond Technical College	37705
NC A&T University	20700	River Mill Academy Charter	30103
NC Auctioneers Licensing Board	18740	Roanoke Rapids City Schools	34220
NC Brd Of Examiners Of Practicing Psychologists	18780	Roanoke-Chowan Community College	34605
NC Central University	20800	Robeson Community College	37805
NC Department Of Military & Veterans Affairs	11050	Robeson County Schools	37800
NC Dept Of Environmental Quality	11300	Rockingham Community College	37905
NC Housing FinaNCe AgeNCy	11310	Rockingham County Schools	37900
NC School Of ScieNCe & Mathematics	10950	Rowan-Cabarrus Community College	38005
NC School Of The Arts	20200	Rowan-Salisbury School System	38000
NC State University	21300	Roxboro Community School	37301
Neuse Charter School	35106	Rutherford County Schools	38100
New Bern Craven County Board Of Education	32500	Sampson Community College	38205
New Hanover County Schools	36500	Sampson County Schools	38200
Newton-Conover City Schools	31820	Sandhills Community College	36305
North Carolina Board Of Opticians	18640	Scotland County Schools	38300
North Carolina Education Lottery	10200	Secretary Of State	13700
North Carolina Innovative School District	39220	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 Controllor	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 H: 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		