

West Virginia Teachers' Retirement System

Actuarial Valuation as of July 1, 2022

March 2023



110 W. Berry Street
Suite 1300
Fort Wayne, IN 46802

March 31, 2023

West Virginia Consolidated Public Retirement Board
West Virginia Teachers' Retirement System
4101 MacCorkle Avenue, SE
Charleston, WV 25304

Dear Board Members,

We respectfully present our report on the actuarial valuation of the West Virginia Teachers' Retirement System (TRS) as of July 1, 2022. This valuation presents the liabilities of the System as of the valuation date and the projected Employer contribution for fiscal year 2024.

The valuation results indicate:

- The State contribution to TRS for fiscal year 2024 is \$379,228,000. The State appropriation needed for fiscal year 2024 for the Teachers' Retirement Systems (TRS and TDC) under the School Aid Formula is \$348,969,000.
- The funded percentage of the actuarial accrued liability at the valuation date is 78.4% (on an actuarial value of assets basis), compared to 76.0% for the prior year.

The valuation results reflect the pay increase effective July 1, 2022, of \$1,464 per year for Service Personnel and \$2,240 per year for Teachers. This flat-dollar increase was used in the valuation in place of the assumed salary scales for FY 2023.

Valuation results presented in this report are developed for use by the West Virginia Consolidated Public Retirement Board in assessing the funding requirements of the system. Measurements made for financial reporting purposes under GASB Statements Nos. 67 and 68 are reported separately. Use of this report for any other purpose or by other parties may not be appropriate and may result in mistaken conclusions due to failure to understand applicable assumptions, methodologies, or inapplicability of the report for that purpose. Because of the risk of misinterpretation of actuarial results, Buck recommends requesting its advance review of any statement, document, or filing to be based on information contained in this report. Buck will accept no liability for any such statement, document, or filing made without its prior review.

Future actuarial measurements may differ significantly from current measurements due to system experience differing from that anticipated by the economic and demographic assumptions, changes expected as part of the natural operation of the methodology used for these measurements, and changes in System provisions, or applicable law or regulations. An analysis of the potential range of such future differences is beyond the scope of this valuation. However, Actuarial Standard of Practice (ASOP) No. 51 requires certain disclosures of potential risks to the System, which provide useful information for intended users of actuarial reports who determine System contributions or evaluate the adequacy of specified contribution levels to support benefit provisions. The disclosures required under ASOP 51 are developed by the Board Actuary and reported separately.

The valuation is based on membership data as of June 30, 2022, maintained by the West Virginia Consolidated Public Retirement Board, and financial information received from the West Virginia Investment Management Board. The data were not audited by Buck but were reviewed for reasonableness and consistency with prior years' data. The accuracy of the results of the valuation is dependent on the accuracy of the data.

This report fairly presents the actuarial position of the West Virginia Teachers' Retirement System (TRS) as of July 1, 2022, in accordance with Actuarial Standards of Practice (ASOPs) applied on a basis consistent with that of the preceding valuation. In our opinion, the assumptions used in preparing the liabilities and costs are individually reasonable with respect to TRS in view of its experience and represent our best estimate of anticipated future experience of TRS. The mortality improvement assumption was selected in accordance with Actuarial Standards of Practice No. 35.

Actuarial Standards of Practice No. 27 and No. 35 require the actuary to disclose the information and analysis used to support the actuary's determination that the assumptions selected by the System sponsor do not significantly conflict with those that, in the actuary's professional judgment, are reasonable for the purpose of the measurement. Buck provides advice on reasonable assumptions when performing periodic experience studies. The Board selects the assumptions used and the signing actuaries review the assumptions annually through discussion with the Board staff and analysis of actuarial experience.

In the case of the Board's selected assumed rate of return on assets, the signing actuaries have used economic information provided by Buck's Investment Consulting and Financial Risk Management practices. Buck's Capital Market Assumptions provide relevant expected returns, standard deviations, and correlations. Projected returns are then developed for the portfolio using the GEMS[®] Economic Scenario Generator from Conning & Company. This sophisticated model uses a multifactor approach to create internally consistent, realistic economic scenarios for all asset classes that reflect the current economic environment as a starting point. Equity returns include stochastic volatility with jumps to reflect extreme infrequent events. However, such scenarios do not typically impact the 5th through 95th percentiles. Corporate bond yields are generated by adding credit spreads to the corresponding zero-coupon Treasury Yields. The credit spread is driven by several factors, including equity returns, and also contains a shock process to allow the model to generate scenarios like the 2008 Financial Crisis. GEMS[®] does not, however, model specific risks such as war, pandemics, political risks, severe economic dislocations occurring with greater frequency or severity than predicted by the model, or the risk that relationships among macroeconomic variables differ from those of the past. From these scenarios, a probabilistic model of expected returns is created reflecting the duration of investment and the approximate allocation of assets in the portfolio to various asset classes. Under current calibrations, GEMS[®] will tend to show higher expected returns for longer durations and greater divergence between arithmetic and geometric average returns at higher standard deviations of portfolio return.

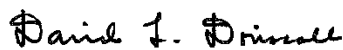
Based on the actuaries' analysis, including consistency with other assumptions used in the valuation, discussions with Buck's investment consultants, the percentiles generated by the GEMS[®] model, and review of actuarial gain/loss analysis, the signing actuaries believe the assumptions, in their professional judgment, are reasonable for purposes of the measurement.

Where presented, the "funded percentage" and "unfunded accrued liability" are typically measured using the actuarial value of assets. Use of the market value of assets instead would result in different funded percentages and unfunded accrued liabilities. Moreover, the funded percentage presented is appropriate for evaluating the need and level of future contributions but does not represent the funded status of the System if it were to settle (i.e., purchase annuities to cover) a portion or all of its liabilities.

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 GEMS[®] model disclosed above, Buck uses third-party software to perform annual actuarial valuations and projections. The model is intended to calculate the liabilities associated with the System's provisions using data and assumptions as of the measurement date under the funding methods specified in this report. The output from the third-party vendor software is used as input to an internally-developed model that applies applicable funding methods and policies to the derived liabilities and other inputs, such as System assets and contributions, to generate many of the exhibits found in this report. Buck has an extensive review process in which the results of the liability calculations are checked using detailed sample life output, changes from year to year are summarized by source, and significant deviations from expectations are investigated. Other funding outputs and the internal model are similarly reviewed in detail and at a higher level for accuracy, reasonability, and consistency with prior results. Buck also reviews the third-party model when significant changes are made to the software. This review is performed by experts within Buck who are familiar with applicable funding methods, 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.

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

Buck Global, LLC



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1. Summary of Valuation

This report presents the results of the July 1, 2022, actuarial valuation of the West Virginia Teachers' Retirement System and includes the projected employer contribution requirement for FY 2024. A summary of the System provisions, a summary of the actuarial assumptions and methods, and supplementary membership tables used in the valuation are also included.

Valuation Results

The West Virginia Teachers' Retirement System (TRS) is a defined benefit plan covering education employees hired prior to July 1, 1991, or hired on and after July 1, 2005, and prior Teachers' Defined Contribution Plan (TDC) members who elected to transfer from TDC to TRS effective July 1, 2008, or August 1, 2008. The plan provides unreduced monthly benefits to Tier 1 members upon retirement after 35 years of service, or at age 60 after completing 5 years of service, or at age 55 after completing 30 years of service. Tier 2 members are eligible for unreduced monthly benefits upon retirement at age 62 after completing 10 years of service. The System also provides reduced early retirement benefits, benefits in the event of disability or death while active, and deferred benefits to members who terminate prior to retirement, providing System eligibility conditions are met.

The System is funded through member contributions of 6% of payroll and employer contributions sufficient to provide for any remaining normal cost (after member contributions are accounted for), to amortize the unfunded liability as a level-dollar amount starting from FY 2009, and to amortize the liability for benefit improvements to annuitants under HB 3095 over a 6-year period beginning July 1, 2019.

The major purpose of this valuation is to determine the amount of appropriation needed for FY 2024 for the West Virginia State Teachers' Retirement System under the School Aid Formula (SAF), which is determined to be \$348,969,000. Two components of the SAF determination are calculated in the valuation process: the contributions required from the State for TRS, and a projection of the State's contributions to TDC, both for FY 2024.

The State's contribution to TRS is based on an actuarial valuation of the provisions of the State code and the participant data, in consideration of the assets held in trust for TRS. The details of the TRS contribution for FY 2024 are shown in Table 1.

The State's TRS contribution for FY 2024, assuming a mid-year payment, consists of three separate components:

- The State share of the normal cost,
- The amount needed to fund the unfunded actuarial accrued liability, net of the liability for recent benefit changes, over a 40-year period which began in 1994 (as required by Section 18-9A-6a of the State code), and
- The amount required to separately amortize the liability for recent benefit changes. For FY 2024, the only separate amortization is for HB 3095.

The total State TRS contribution on this basis is \$379,228,000.

Starting with FY 2009, the annual amortization payment toward the unfunded liability is determined as a level-dollar amount that is amortized over a 40-year period from July 1, 1994. In prior years, the amortization was determined as a level percentage of the projected total education payroll. The total amount contributed to the System from FY 2009 forward will fund the normal cost plus interest and principal on the unfunded liability, fully amortizing the unfunded liability by the end of FY 2034.

1. Summary of Valuation

Table 2 presents the development of the School Aid Formula, separately identifying the TRS contribution based on the original 40-year amortization period, any special payments toward the additional unfunded due to recent System improvements, and other specific components. Detailed projections of the balance of the 40-year funding program under the level-dollar amortization schedule, net of any separately funded improvements, are shown in Tables 4 and 5.

The projected TDC contribution for FY 2024 for the School Aid Formula is based on projected payroll for that participant population. The split of both the TRS and the TDC contributions is based on information provided by the state Education Department. The projected fire insurance premium tax shown in Table 2 was provided by the Department of Administration.

The valuation results reflect the pay increase effective July 1, 2022, of \$1,464 per year for Service Personnel and \$2,240 per year for Teachers. This flat-dollar increase was used in the valuation in place of the assumed salary scales for FY 2023

Comments on Valuation Results

Table 1 presents the development of the valuation results as of July 1, 2022, and, for comparison purposes, July 1, 2021. Table 2 presents the development of the School Aid Formula appropriation for FY 2024.

Table 3a presents the development of the actuarial gain/(loss) as of July 1, 2022. Table 3b presents a reconciliation of the unfunded liability compared to the prior year. Table 3c provides detail on the sources of the liability gain/(loss).

The expected unfunded actuarial accrued liability as of July 1, 2022, was \$2.532 billion. The actual unfunded liability at the valuation date is \$2.500 billion, a decrease of \$0.032 billion. The decrease in the unfunded liability was primarily due to the following:

- The return on assets for the year ending June 30, 2022, was approximately (6.2)% on a market value basis and 7.7% on an actuarial value basis. The return on the actuarial value basis was greater than the prior year's valuation assumption of 7.25% and decreased the unfunded liability by approximately \$41 million.
- The demographic and salary experience resulted in a net liability loss, increasing the unfunded liability by approximately \$10 million, which is 0.08% of the expected liability.

Tables 4 and 5 present projections of the unfunded accrued liability, net of any separately funded liability, to June 30, 2034. Table 4 illustrates the expected pattern of change in the unfunded liability over the remaining 12-year period. The unfunded liability is expected to decrease steadily to zero at the end of the period. Table 5 presents the expected funding progress toward the unfunded actuarial accrued liability based on the funding policy. This table illustrates the expected dollar amount of change in this component of the unfunded liability from year to year.

Table 6 presents a cash flow projection of expected asset balances, contributions, benefit payments, and earnings over the period to FY 2034 on a closed-group basis. Under the System sponsor's funding policy of contributing the actuarially determined contribution, and under the assumption that there are no future experience gains or losses, and no new entrants, future expected contributions are expected to increase as a percent of pay until the System is fully funded, at which time they will decrease to a lower level percent of pay. The System's funded percentage is expected to increase and eventually reach 100%.

The valuation results were determined using an interest rate of 7.25% with an underlying inflation assumption of 2.75%.

1. Summary of Valuation

System Membership

A summary of System membership, with a comparison to the prior year, follows:

Group	July 1, 2022	July 1, 2021
Actives	34,871	35,113
Retirees and Beneficiaries	37,097	37,282
Terminated Vested	3,318	2,919
Terminated Non-Vested	<u>6,437</u>	<u>5,319</u>
Total	81,723	80,633

Table 9 presents a reconciliation of System membership over the year and Table 10 presents supplemental information on System membership.

Tables 11(a) and 11(b) show the number and total compensation for Teacher and Non-Teacher (including State) active members by 5-year age and eligibility service groupings as of July 1, 2022.

Table 12 shows the number and average monthly benefits of retirees and beneficiaries included in the valuation distributed by fifth age group. Table 13 shows a similar distribution for terminated members entitled to deferred benefits.

1. Summary of Valuation

Table 1
Development of Valuation Results (000's omitted)

Valuation Date	July 1, 2022	July 1, 2021
1. Present Value of Future Benefits		
a. Active	\$ 4,882,363	\$ 4,780,788
b. Inactive - Retirees	7,535,931	7,530,645
- Disabled Retirees	189,143	199,453
- Beneficiaries	303,765	295,203
- Vested Terminated	150,073	128,313
- Non-Vested Terminated	30,685	23,975
c. Total	\$ 13,091,960	\$ 12,958,377
2. Actuarial Accrued Liability	\$ 11,592,440	\$ 11,495,184
3. Actuarial Value of Assets	9,091,948	8,740,204
4. Unfunded Actuarial Accrued Liability (UAL)	\$ 2,500,492	\$ 2,754,980
5. Annual Normal Cost Rate: Type 1 (Pre 7/1/1991 Group)		
a. Present Value of Future Normal Costs	\$ 18,035	\$ 24,487
b. Present Value of Future Pay	\$ 176,564	\$ 237,974
c. Normal Cost Rate as a % of Payroll	10.21%	10.29%
d. Employee share	6.00%	6.00%
e. Employer share	4.21%	4.29%
f. TRS FY 2023 (2022) Normal Cost Payroll	\$ 64,487	\$ 81,431
g. Employer FY 2023 (2022) Normal Cost (BOY)	\$ 2,715	\$ 3,493
h. TRS FY 2024 (2023) Normal Cost Payroll	\$ 47,464	\$ 61,649
i. Employer FY 2024 (2023) Normal Cost (BOY)	\$ 1,998	\$ 2,645
6. Annual Normal Cost Rate: Type 3 (Post 6/30/2005 Group)		
a. Present Value of Future Normal Costs	\$ 1,481,486	\$ 1,438,707
b. Present Value of Future Pay	\$ 14,863,050	\$ 14,320,405
c. Normal Cost Rate as a % of Payroll	9.97%	10.05%
d. Employee share	6.00%	6.00%
e. Employer share	3.97%	4.05%
f. TRS FY 2023 (2022) Normal Cost Payroll	\$ 1,622,111	\$ 1,554,980
g. Employer FY 2023 (2022) Normal Cost (BOY)	\$ 64,398	\$ 62,977
h. TRS FY 2024 (2023) Normal Cost Payroll	\$ 1,702,517	\$ 1,636,288
i. Employer FY 2024 (2023) Normal Cost (BOY)	\$ 67,590	\$ 66,270

1. Summary of Valuation

Table 1 (continued)

Development of Valuation Results (000's omitted)

Valuation Date	July 1, 2022	July 1, 2021
7. Employer Contribution for FY 2023 and FY 2024, (FY 2022 and FY 2023), assumes mid-year contribution:		
a. FY 2023 (2022)	FY 2023	FY 2022
i. TRS and TDC Payroll	\$ 1,805,619	\$ 1,758,704
ii. FY 2023 (2022) TRS Contribution		
A. Normal Cost	69,504	68,837
B. Amortization components:		
- Original UAL over 40 years as a level-dollar amount	307,698	322,390
- H.B. 3095, over 6 years from 7/1/2019	1,064	1,064
C. Total	\$ 378,266	\$ 392,291
iii. FY 2023 (2022) Contribution as a % of Payroll	20.95%	22.31%
b. FY 2024 (2023)	FY 2024	FY 2023
i. TRS and TDC Payroll	\$ 1,863,399	\$ 1,814,982
ii. FY 2024 (2023) TRS Contribution		
A. Normal Cost	72,066	71,369
B. Amortization components:		
- Original UAL over 40 years as a level-dollar amount	306,098	319,550
- H.B. 3095, over 6 years from 7/1/2019	1,064	1,064
C. Total	\$ 379,228	\$ 391,983
iii. FY 2024 (2023) Contribution as a % of Payroll	20.35%	21.60%
iv. FY 2024 (2023) SAF appropriation ¹	\$ 348,969	\$ 360,618
v. FY 2024 (2023) SAF appropriation as a % of Payroll	18.73%	19.87%

¹ The School Aid Formula retirement allocation includes the amount that the State appropriates for the Teachers Defined Contribution Plan and required payments toward the TRS Unfunded Actuarial Accrued Liabilities. It does NOT include amounts contributed to TRS by nonstate groups or the fire premium tax.

1. Summary of Valuation

Table 2

Development of School Aid Formula Appropriation for Fiscal Year 2024 (000's omitted)

TRS Contribution for FY 2024	\$ 378,164
+ 7.50% x School Aid Formula (TDC only) ¹	5,925
- 15.0% x County Portion of the Old Group TRS payroll ²	(2,209)
- 7.5% x County Portion of the New Group TRS payroll ³	(39,524)
- Fire Tax Per Code Section 33-3-14(d)	(3,298)
+ State payment equal to TDC forfeitures ⁴	<u>8,847</u>
Subtotal of Standard SAF Appropriation	\$ 347,905
Special Payments for Benefit Improvements under H.B. 3095	<u>1,064</u>
Total FY 2024 SAF Appropriation	\$ 348,969

¹ School Aid Formula for TDC only is 68.35% of FY 2024 TDC pay for County employees plus FY 2024 TDC pay for State employees = 68.35% x \$108,747 + \$4,671 = \$79,000.

² County portion of the Old Group TRS payroll is 31.65% of FY 2024 TRS pay for County employees = 31.65% x \$46,540 = \$14,730.

³ County portion of the New Group TRS payroll is 31.65% of FY 2024 TRS pay for County employees = 31.65% x \$1,665,034 = \$526,983.

⁴ Actual amount to be released from the TDC suspense account at 6/30/2022 per Code Section 18-7A-18a(b).

1. Summary of Valuation

Table 3a

Actuarial Gain/(Loss) as of July 1, 2022 (000's omitted)

	Amount
1. Expected Actuarial Accrued Liability	
a. Actuarial Accrued Liability as of July 1, 2021	\$ 11,495,184
b. Normal Cost	164,655
c. Interest on (a) and (b) at 7.25%	845,338
d. Benefit Payments and Transfers	(890,707)
e. Interest on (d) at 7.25%, Adjusted for Timing	(31,723)
f. Assumption Changes	-
g. Plan Changes	-
h. Expected Actuarial Accrued Liability as of July 1, 2022	<u>\$ 11,582,747</u>
2. Actual Actuarial Accrued Liability as of July 1, 2022	\$ 11,592,440
3. Liability Gain/(Loss): (1h) - (2)	\$ (9,693)
4. Expected Actuarial Asset Value	
a. Actuarial Value of Assets as of July 1, 2021	\$ 8,740,204
b. Interest on (a) at 7.25%	633,665
c. Member Contributions	95,694
d. Employer Contributions	483,005
e. Interest on (c) and (d) at 7.25%, Adjusted for Timing	20,611
f. Benefit Payments and Transfers	(890,707)
g. Interest on (f) at 7.25%, Adjusted for Timing	(31,723)
h. Expected Actuarial Asset Value as of July 1, 2022	<u>\$ 9,050,749</u>
5. Actual Actuarial Asset Value as of July 1, 2022	\$ 9,091,948
6. Actuarial Asset Value Gain/(Loss): (5) - (4h)	\$ 41,199
7. Total Actuarial Gain/(Loss): (3) + (6)	\$ 31,506

1. Summary of Valuation

Table 3b

Change in Unfunded Liability during FY 2022 (000's omitted)

	Amount
1. Unfunded Liability as of July 1, 2021	\$ 2,754,980
a. Interest on Unfunded Liability at 7.25%	\$ 199,736
b. Normal Cost	164,655
c. Member Contributions	(95,694)
d. Employer Contributions	(483,005)
e. Interest on (b) through (d) at 7.25%, Adjusted for Timing	(8,674)
f. Assumption Changes	-
g. Plan Changes	-
h. Expected Change in Unfunded Liability during FY 2022	<u>\$ (222,982)</u>
2. Expected Unfunded Liability as of July 1, 2022: (1) + (1h)	\$ 2,531,998
a. Liability (Gain)/Loss during FY 2022	\$ 9,693
b. Actuarial Assets (Gain)/Loss during FY 2022	<u>(41,199)</u>
c. Total Actuarial (Gain)/Loss during FY 2022	\$ (31,506)
3. Actual Unfunded Liability as of July 1, 2022: (2) + (2c)	\$ 2,500,492

1. Summary of Valuation

Table 3c

Liability Gain/(Loss) by Source as of July 1, 2022 (000's omitted)

	Gain/(Loss)
1. Demographic and Salary Experience	
a. Retirement Experience	\$ (13,939)
b. Termination Experience	16,182
c. Disability Experience	(353)
d. Active Mortality Experience	3,876
e. Inactive Mortality Experience	21,070
f. Salary Increases	(34,049)
g. New Entrants and Rehires	(16,034)
h. Benefit Payments Different Than Expected	631
i. Miscellaneous ¹	12,923
j. Total	<u>\$ (9,693)</u>
2. Assumption Changes	\$ 0
3. Plan Changes	\$ 0
4. Total	\$ (9,693)

¹ Includes the effects of data updates typical of the annual reconciliation, programming revisions, software updates, and other experience which does not fit the other demographic categories.

1. Summary of Valuation

Table 4

Projection of Unfunded Accrued Liability and Annual Contributions (000's omitted)

FY Ending 6/30	Unfunded AAL BOY ¹	Employer Normal Cost (MOY) ²		Projected Payroll			Total Type 1 Employer Contribution (MOY) ³		Total Type 3 Employer Contribution (MOY)	
		Type 1	Type 3	Type 1 TRS	Type 3 TRS	TRS+TDC	% of Payroll	Amount	% of Payroll	Amount
2023	\$ 2,497,613	\$ 2,739	\$ 68,630	\$ 64,487	\$ 1,622,111	\$ 1,805,619	17.85%	\$ 322,289	3.80%	\$ 68,630
2024	2,347,759	2,069	69,997	47,464	1,702,517	1,863,399	16.54%	308,167	3.76%	69,997
2025	2,200,972	1,640	73,103	37,621	1,778,048	1,923,027	16.00%	307,738	3.80%	73,103
2026	2,043,542	1,278	76,234	29,318	1,854,198	1,984,564	15.49%	307,376	3.84%	76,234
2027	1,874,699	994	79,386	22,804	1,930,877	2,048,070	14.99%	307,092	3.88%	79,386
2028	1,693,615	753	82,572	17,265	2,008,370	2,113,609	14.52%	306,851	3.91%	82,572
2029	1,499,402	557	85,813	12,788	2,087,212	2,181,244	14.06%	306,655	3.93%	85,813
2030	1,291,109	405	89,107	9,278	2,167,331	2,251,044	13.62%	306,503	3.96%	89,107
2031	1,067,714	287	92,473	6,589	2,249,201	2,323,077	13.19%	306,385	3.98%	92,473
2032	828,123	203	95,899	4,648	2,332,530	2,397,416	12.78%	306,301	4.00%	95,899
2033	571,162	135	99,414	3,092	2,418,011	2,474,133	12.38%	306,233	4.02%	99,414
2034	295,571	87	103,010	1,985	2,505,454	2,553,305	11.99%	306,185	4.03%	103,010

¹ Net of any separately funded liability for benefit increases.

² Net of member contributions.

³ Net of any amortization amounts for separately funded benefit increases.

1. Summary of Valuation

Table 5

Funding Progress of Unfunded Actuarial Accrued Liability Under Current Funding Policy (000's omitted)

FY Ending 6/30	Unfunded AAL BOY ¹	Interest on Unfunded at 7.25%	MOY Contribution Toward Unfunded ²	Unfunded Funding Progress ³
2023	\$ 2,497,613	\$ 181,077	\$ 319,550	\$ 149,854
2024	2,347,759	170,213	306,098	146,787
2025	2,200,972	159,570	306,098	157,430
2026	2,043,542	148,157	306,098	168,843
2027	1,874,699	135,916	306,098	181,084
2028	1,693,615	122,787	306,098	194,213
2029	1,499,402	108,707	306,098	208,293
2030	1,291,109	93,605	306,098	223,395
2031	1,067,714	77,409	306,098	239,591
2032	828,123	60,039	306,098	256,961
2033	571,162	41,409	306,098	275,591
2034	295,571	21,429	306,098	295,571

¹ Net of any separately funded liability for benefit increases.

² Net of employer contribution toward normal cost and any separately funded benefit increases.

³ Equals (MOY Contribution) x 1.035616 - (Interest on Unfunded)

1. Summary of Valuation

Table 6
Cash Flow Projection FY 2023 Through FY 2034 (000's omitted)

FY Ending	MV Assets	Expected			MV Assets	
6/30	Beg. of Year	Contributions	Benefits	Earnings	Net Income	End of Year
2023	\$ 9,001,857	\$ 493,179	\$ (941,117)	\$ 636,681	\$ 188,743	\$ 9,190,600
2024	9,190,600	470,116	(917,940)	650,369	202,545	9,393,145
2025	9,393,145	465,270	(923,263)	664,691	206,698	9,599,843
2026	9,599,843	460,058	(926,675)	679,370	212,753	9,812,596
2027	9,812,596	456,286	(929,532)	694,558	221,312	10,033,908
2028	10,033,908	452,592	(931,565)	710,399	231,426	10,265,334
2029	10,265,334	448,812	(933,641)	726,969	242,140	10,507,474
2030	10,507,474	444,858	(935,120)	744,331	254,069	10,761,543
2031	10,761,543	440,739	(936,865)	762,542	266,416	11,027,959
2032	11,027,959	436,450	(938,531)	781,645	279,564	11,307,523
2033	11,307,523	431,901	(941,252)	801,654	292,303	11,599,826
2034	11,599,826	427,224	(943,440)	822,602	306,386	11,906,212

Note: The projection of future benefit payments is based on all participants included in the valuation, including active participants who are not yet receiving benefits. Expected contributions are based on a projection of payroll on a closed-group basis. No new entrants are assumed in the projection.

1. Summary of Valuation

Table 7a
Valuation Assets as of June 30, 2022 (000's omitted)

	June 30, 2022	June 30, 2021
Assets		
Cash with State Treasurer	\$ 3,369	\$ 2,457
Investments at Fair Value	8,980,422	9,886,657
Contributions Receivable	21,388	24,697
Participant Loans Receivable	712	998
Miscellaneous Revenue Receivable	-	13
Total Assets	<u>\$ 9,005,891</u>	<u>\$ 9,914,822</u>
Liabilities		
Accrued Expenses and Other Payables	<u>4,034</u>	<u>35</u>
Market Value of Assets	\$ 9,001,857	\$ 9,914,787
Adjustment for Deferred Gains / (Losses)	<u>(90,091)</u>	<u>1,174,583</u>
Actuarial Value of Assets	\$ 9,091,948	\$ 8,740,204

Table 7b
Four-Year Asset Smoothing as of June 30, 2022 (000's omitted)

FY Ending 6/30	Gain/(Loss) on Actuarial Value of Assets	Percent Deferred	Gain/(Loss) Deferred as of June 30, 2022	Gain/(Loss) Recognized for FY ending June 30, 2022
2022	\$ (1,227,047)	75%	\$ (920,285)	\$ (306,762)
2021	1,829,013	50%	914,507	457,253
2020	(337,250)	25%	(84,313)	(84,313)
2019	(114,208)	0%	-	(28,552)
			<u>\$ (90,091)</u>	<u>\$ 37,626</u>

1. Summary of Valuation

Table 8

Statement of Changes in Market Value of Assets for Year ended June 30, 2022 (000's omitted)

Market Value of Assets - Beginning of Year	\$	9,914,787
Additions:		
Contributions:		
Member	\$	95,694
Employer		128,717
School Aid Formula		266,513
Make Up Contributions		-
Special Appropriations		87,775
Voluntary Special Contribution Members		-
Special Contribution Required Employers		-
Contribution Delinquency Fees		-
§33-3-14(d) Fees		-
Subtotal	\$	578,699
Investment Income:		
Net Appreciation in Fair Value ¹		(600,605)
Investment income		61
Subtotal	\$	(600,544)
Transfers from plans		0
Other Income		3,573
Total	\$	(18,272)
Deductions and Transfers:		
Benefit Expense	\$	877,766
Refunds of Contributions		12,753
Administrative Expenses		3,951
Transfers to plans		188
Total	\$	894,658
Net Increase	\$	(912,930)
Market Value of Assets - End of Year	\$	9,001,857
Investment Return for Year:		
Valuation purposes (assumes mid-year transactions and offsets investment income by investment and administrative expenses)		-6.19%
Per Investment Management Board (time-weighted, excluding administrative expense)		-6.3%

¹ Net of Investment Expense

1. Summary of Valuation

Table 9
Reconciliation of Plan Participants

	Active	Non-Vested Terms	Vested Terms	Service Retirees	Disabled Retirees	Beneficiaries	Total
Census as of July 1, 2021	35,113	5,319	2,919	32,182	2,069	3,031	80,633
New Entrants	2,903	290	-	-	-	286	3,479
Returned to Active Status	270	(184)	(86)	-	-	-	-
Terminated Non-Vested	(1,174)	1,174	-	-	-	-	-
Terminated Vested	(727)	-	727	-	-	-	-
Withdrew Contributions	(256)	(126)	(84)	-	-	-	(466)
Retired	(1,070)	-	(120)	1,190	-	-	-
Disabled	(23)	-	(10)	-	33	-	-
Deceased	(91)	(25)	(26)	(1,215)	(139)	(337)	(1,833)
Certain Period Expired	-	-	-	-	-	(5)	(5)
Adjustments	(74)	(11)	(2)	2	-	-	(85)
Census as of July 1, 2022	34,871	6,437	3,318	32,159	1,963	2,975	81,723

1. Summary of Valuation

Table 10
Summary of Membership

	July 1, 2022 Valuation	July 1, 2021 Valuation
Active Members:		
Teachers	20,686	20,873
Non-Teachers (including State)	14,185	14,240
Total	<u>34,871</u>	<u>35,113</u>
Inactive Members:		
Service Retirees	32,159	32,182
Disabled Retirees	1,963	2,069
Beneficiaries	2,975	3,031
Vested Terminated	3,318	2,919
Non-Vested Terminated	6,437	5,319
Total	<u>46,852</u>	<u>45,520</u>
Total Members	81,723	80,633

1. Summary of Valuation

Table 11(a)
Distribution of the Number and Total Annual Compensation of Active Teachers as of July 1, 2022

Attained Age	Years of Eligibility Service									Total Count / Total Comp
	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 & over	
	Count / Total Comp	Count / Total Comp	Count / Total Comp	Count / Total Comp	Count / Total Comp	Count / Total Comp	Count / Total Comp	Count / Total Comp	Count / Total Comp	
Under 25	606 26,289,367									606 26,289,367
25 - 29	1,641 76,132,297	483 24,011,531								2,124 100,143,828
30 - 34	773 36,831,141	1,503 77,817,963	337 18,420,394							2,613 133,069,498
35 - 39	592 29,113,765	883 46,885,080	1,387 79,301,620	266 16,298,691						3,128 171,599,156
40 - 44	558 27,822,596	706 38,423,020	844 48,404,637	1,084 66,546,229	108 6,998,660	1 55,604				3,301 188,250,746
45 - 49	409 20,780,409	545 29,937,536	573 33,688,763	613 38,635,937	519 33,817,306	47 3,436,520				2,706 160,296,471
50 - 54	363 18,872,707	400 22,382,824	509 29,750,543	511 32,004,783	457 30,375,923	399 27,735,351	80 5,820,467			2,719 166,942,598
55 - 59	201 11,064,741	257 14,674,067	330 19,883,846	311 19,447,993	282 18,823,421	216 15,205,029	301 21,961,337	102 7,514,945		2,000 128,575,379
60 - 64	83 4,850,349	130 7,617,748	178 10,878,844	170 10,671,546	139 9,041,975	81 5,664,747	91 6,782,253	150 11,385,987	29 2,219,249	1,051 69,112,698
65 - 69	30 1,667,324	52 3,109,474	49 2,898,359	46 2,864,084	43 2,816,706	23 1,572,348	13 914,950	24 1,811,200	47 3,886,907	327 21,541,352
70 & over	14 856,320	17 1,046,018	12 691,794	12 766,079	8 564,710	9 683,833	7 487,154	11 883,490	21 1,751,634	111 7,731,032
Total	5,270 254,281,016	4,976 265,905,261	4,219 243,918,800	3,013 187,235,342	1,556 102,438,701	776 54,353,432	492 35,966,161	287 21,595,622	97 7,857,790	20,686 1,173,552,125

1. Summary of Valuation

Table 11(b)

Distribution of the Number and Total Annual Compensation of Active Non-Teachers (including State Employees) as of July 1, 2022

Attained Age	Years of Eligibility Service									Total Count / Total Comp
	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 & over	
	Count / Total Comp	Count / Total Comp	Count / Total Comp	Count / Total Comp	Count / Total Comp	Count / Total Comp	Count / Total Comp	Count / Total Comp	Count / Total Comp	
Under 25	210 5,795,538	1 38,221								211 5,833,759
25 - 29	373 10,978,300	82 3,013,368	1 38,785							456 14,030,453
30 - 34	525 15,042,752	215 7,647,851	39 2,239,202	1 49,847						780 24,979,652
35 - 39	597 17,205,583	274 9,706,949	149 8,094,726	49 2,800,187						1,069 37,807,445
40 - 44	710 20,274,961	446 14,994,350	260 10,986,568	188 10,818,849	27 1,751,924	1 37,957				1,632 58,864,609
45 - 49	631 18,103,297	537 17,606,579	378 14,384,081	264 12,327,490	125 7,069,261	22 1,194,097				1,957 70,684,805
50 - 54	619 18,175,729	592 19,126,053	557 20,314,692	397 15,971,499	230 11,624,181	111 6,840,084	28 1,720,977	3 155,336		2,537 93,928,551
55 - 59	493 14,259,555	483 15,481,471	542 19,148,153	544 20,608,091	305 12,952,273	154 8,014,748	100 6,649,268	49 3,299,751	3 160,838	2,673 100,574,148
60 - 64	302 8,851,783	347 10,837,691	348 11,672,962	349 12,806,447	276 11,481,978	144 6,888,376	60 3,431,898	55 3,613,666	41 2,764,154	1,922 72,348,955
65 - 69	112 3,051,770	150 4,660,524	116 3,857,573	95 3,483,613	91 3,540,778	37 1,688,723	17 823,724	17 1,044,947	27 1,515,775	662 23,667,427
70 & over	57 1,529,767	47 1,463,734	55 1,694,386	33 1,206,785	31 1,191,386	15 734,830	20 895,684	10 484,611	18 1,124,969	286 10,326,152
Total	4,629 133,269,035	3,174 104,576,791	2,445 92,431,128	1,920 80,072,808	1,085 49,611,781	484 25,398,815	225 13,521,551	134 8,598,311	89 5,565,736	14,185 513,045,956

1. Summary of Valuation

Table 12
Distribution of the Number and Average Monthly Benefits of Retired Participants as of July 1, 2022

Current Age	Service Retirees			Disabled Retirees			Beneficiaries			Total		
	Count	Avg. Age	Avg. Mo. Benefit	Count	Avg. Age	Avg. Mo. Benefit	Count	Avg. Age	Avg. Mo. Benefit	Count	Avg. Age	Avg. Mo. Benefit
under 35	-	-	-	-	-	-	16	27	1,244	16	27	1,244
35 - 39	-	-	-	2	38	822	11	37	1,368	13	37	1,284
40 - 44	-	-	-	11	43	860	12	42	1,238	23	42	1,058
45 - 49	-	-	-	21	47	749	37	47	973	58	47	892
50 - 54	5	54	2,062	52	52	901	62	52	880	119	52	939
55 - 59	604	58	3,203	182	57	1,055	105	57	903	891	58	2,493
60 - 64	3,526	62	2,526	330	62	1,067	194	62	1,221	4,050	62	2,345
65 - 69	7,372	67	2,421	423	67	1,031	369	67	1,297	8,164	67	2,298
70 - 74	8,836	72	2,317	451	72	992	575	72	1,346	9,862	72	2,199
75 - 79	5,507	77	1,959	304	77	870	535	77	1,238	6,346	77	1,846
80 - 84	3,210	82	1,545	153	82	728	464	82	1,013	3,827	82	1,447
85 - 89	1,937	87	1,273	31	87	505	331	87	991	2,299	87	1,222
90 - 94	883	92	1,062	2	92	409	198	92	873	1,083	92	1,026
95 & over	279	97	937	1	100	567	66	97	655	346	97	882
Total	32,159	73	2,133	1,963	69	965	2,975	75	1,143	37,097	73	1,991
Total Annual Benefits			822,978,422			22,728,450			40,811,061			886,517,933

1. Summary of Valuation

Table 13
Distribution of the Number and Average Monthly Benefits
of Participants Entitled to Deferred Benefits as of July 1, 2022

Current Age	Deferred Vested		
	Count	Avg. Age	Avg. Mo. Benefit
under 35	286	32	469
35 - 39	507	37	583
40 - 44	488	42	688
45 - 49	438	47	718
50 - 54	521	52	747
55 - 59	615	57	770
60 - 64	359	61	605
65 - 69	97	66	620
70 - 74	7	71	1,041
75 - 79	-	-	-
80 & over	-	-	-
Total	3,318	48	671
Total Annual Benefits			26,725,061

2. Summary of System Provisions

System Name

The State Teachers' Retirement System (TRS)

Effective Date

Originally enacted effective July 1, 1941.

Member

Membership includes any employee hired before July 1991, or on or after July 1, 2005, in the public schools, state institutions of higher education, certain state departments, and the Board of Regents, and members of the Teachers' Defined Contribution Plan (TDC) who elected to transfer at July 1 or August 1, 2008. Other members of TDC or TIAA-CREF are not eligible for TRS.

Tier 2 provisions apply for employees who are hired for the first time on or after July 1, 2015.

Final Average Salary

Final Average Salary is the average of the member's 5 highest fiscal years of total earnings from covered employment during the member's last 15 years of service.

Contributions

Member Contributions

Members contribute 6.0% of their pay to the retirement System.

Employer Contributions – State

- 15.0% of the payroll of State-employed members,
- 15.0% of School Aid Formula (SAF) covered payroll of county-employed members,
- 7.5% of SAF-covered payroll of members of the TDC Plan,
- a certain percentage of fire insurance premiums paid by state residents, and
- under Code Section 18-9-A-6a, beginning in fiscal year 1996, an amount determined by the State Actuary as being needed to eliminate the TRS Unfunded Liability within 40 years of June 30, 1994.

Employer Contributions – County

15.0% of the payroll of TRS members hired before July 1, 1991, and 7.5% of the payroll for TRS members hired on or after July 1, 2005, and prior TDC members who transferred into TRS at July 1, 2008 or August 1, 2008, who are employed by county boards of education, which is not covered under the School Aid Formula.

Service

Credited Service

Credited Service is granted for each day the member performs work and contributes to the System. At most one year of Credited Service may be earned in any one school year. Credited Service may be granted under certain guidelines for other State employment, for military service, and for out-of-state teaching service.

Contributory Service

Service credited for years in which a member contributes to the retirement System. Contributory service is counted for both eligibility and benefit determination.

2. Summary of System Provisions

Military Service

For Tier 1 members, in a period when a federal Selective Service Act was in effect, Active service in the U.S. military up to 25% of the amount of a member's Contributory Service (but not more than 10 years) will be counted for both eligibility and benefit determination under the retirement system.

Tier 2 members may purchase up to 5 years of active military service with the Armed Forces or National Guard.

Purchased Service

Service in parochial school or with other states' teacher retirement systems may count for benefits (but not eligibility), provided that the member pays TRS double the amount contributed during the first year of employment times the number of years credited plus interest and cashes out his rights to any future benefits under his prior retirement system.

Unused Leave

A Tier 1 retiring member may choose to receive pension credited service for days of sick or annual leave unused at the time of retirement. Credited Service is granted at the rate of twice the actual number of unused days.

Tier 2 members are not eligible to apply unused sick or annual leave for additional credited service.

Service Retirement

Eligibility

A Tier 1 member may retire with an unreduced pension (1) at any age with 35 years of Credited Service, or (2) at age 60 with 5 years of Credited Service. A Tier 1 member may retire with 30 years of Credited Service at any age, with the pension reduced actuarially if retiring before age 55.

A Tier 2 member may retire with an unreduced pension at age 62 with 10 years of Credited Service. A Tier 2 member may retire (1) at age 60 with 10 years of Credited Service, (2) at age 57 with 20 years of Credited Service, or (3) at age 55 with 30 years of Credited Service, with the pension reduced actuarially if retiring before age 62.

Amount

The normal form of benefit is a single life annuity paid monthly, in an amount equal to 2.0% of Final Average Salary times years of Credited Service. Other forms of benefit may be elected, subject to actuarial reduction, including a cash refund annuity, 50% or 100% joint and survivor annuities, and a 10-year certain and life annuity.

Disability Retirement

Eligibility

A member may be eligible to receive a disability retirement benefit after completing 10 years of Credited Service, if the member is disabled for 6 months, unable to perform his regular occupation and the Retirement Board expects the disability to be permanent.

Amount

An annual disability benefit amount, payable monthly as a cash refund annuity, is equal to 2.0% of the member's Final Average Salary times the total years of Credited Service to date of disability.

2. Summary of System Provisions

Deferred Vested Benefit

Eligibility

A Tier 1 member leaving employment with 5 years of Contributory Service may elect to receive either a refund of contributions or a deferred pension commencing at age 62. If a member has 20 years of Contributory Service, the deferral age is age 60.

A Tier 2 member leaving employment with 10 years of Contributory Service may elect to receive either a refund of contributions or a deferred pension commencing at age 64. If a member has 20 years of Contributory Service, the deferral age is age 63.

Amount

An annuity defined as described under "Service Retirement."

Pre-Retirement Death Benefits

Eligibility

The surviving spouse of a deceased member who had attained age 50 and completed 25 years of Credited Service is eligible for the Surviving Spouse Benefit. If a member dies prior to attaining age 50 or completing 25 years of Credited Service a Lump Sum Death Benefit is payable to the beneficiary.

Amount

To the Surviving Spouse

The surviving spouse receives an annuity payable as if the member had retired on the date of death with a 100% joint and survivor pension.

Lump Sum Death Benefit

The sum of the accumulated member contributions with interest and accumulated member contributions without interest is paid to the member's beneficiary or estate.

Refund of Contributions

Eligibility

A member who leaves employment and is not eligible for any other benefit will receive a refund of his contributions to the Teachers' Retirement System.

Amount

A lump sum of the member's accumulated contributions, with compound interest computed on any contributed amount from the end of the fiscal year in which contributed to the date of distribution of the lump sum (but in no case beyond 5 years after the end of the fiscal year during which the member left service). For purposes of this benefit, interest is computed at a 4.0% annual rate.

2. Summary of System Provisions

Post-Retirement Cost-of-Living Adjustments

Ad hoc cost-of-living increases in pensions are periodically granted by the State Legislature. However, the retirement system makes no automatic provision for such increases.

- Effective July 1, 2001, retirees age 65 and over who were retired for at least 5 years received a percentage increase in benefits as follows:
 - Eligible retirees age 65 to age 70 received a 5% increase, and
 - Eligible retirees over age 70 received a 10% increase.

However, if the retiree originally retired under an early retirement window the percentage increase was limited to 3%.

- Effective July 1, 2006, retirees age 70 and over who were retired for at least 5 years received a 3% increase in retirement benefits.
- Effective July 1, 2008, all retirees and applicable beneficiaries thereof who retired with 20 or more years of service and are receiving a primary retiree pension of \$600 or less per month received a thirteenth check single payment of \$600.
- Effective July 1, 2011, a select group of retirees received a thirteenth check single payment of \$1,200.
- A minimum monthly benefit of \$750 was established for pensioners in receipt as of June 3, 2019, who had at least 25 years of service. A corresponding minimum of \$375 was set for beneficiaries under the 50% joint-and-survivor annuity option where the original member had at least 25 years of service.

Changes in System Provisions Since the Prior Valuation

None.

3. Actuarial Assumptions and Methods

Valuation Date

July 1, 2022

Funding Method

The valuation is prepared under the Entry Age Normal Cost Method with individually computed accrued liabilities. The Normal Cost is computed in aggregate. Entry is based on adjusted date of hire (i.e., valuation date minus known past service).

Basis for Assumptions

Experience studies are performed at least once in every 5-year period. This valuation was prepared using demographic assumptions that were recommended to and adopted by the Board based on the experience study covering the period from July 1, 2014, to June 30, 2019. The valuation reflects economic assumptions, which include a rate of investment return of 7.25% per annum, as adopted by the Board, and assumed future salary increases, which were based on the findings presented in the July 1, 2015, to June 30, 2020, Experience Study. These assumptions will remain in effect for valuation purposes until the Board adopts revised assumptions.

Interest Rate and Expenses

The valuation interest assumption is 7.25% per annum, with no loading for system expenses.

Salary Scales

The salary scales are shown in the Appendix. Salary scales include an assumed underlying inflation rate of 2.75%. The ranges of projected salary increases are as follows:

- Teachers 2.75% to 5.90% per year
- Non-Teachers 2.75% to 6.50% per year

The valuation results reflect the pay increase effective July 1, 2022, of \$1,464 per year for Service Personnel and \$2,240 per year for Teachers. This flat-dollar increase was used in the valuation in place of the assumed salary scales for FY 2023.

Pre-Retirement Mortality

Pub-2010 General Employees table, headcount-weighted, projected generationally with scale MP-2019

Post-Retirement Mortality

The post-retirement mortality tables are as follows:

- Retired males 100% of Pub-2010 General Retiree male table, headcount-weighted, projected generationally with scale MP-2019
- Retired females 112% of Pub-2010 General Retiree female table, headcount-weighted, projected generationally with scale MP-2019
- Disabled males 107% of Pub-2010 General / Teachers Disabled male table, headcount-weighted, projected generationally with scale MP-2019
- Disabled females 113% of Pub-2010 General / Teachers Disabled female table, headcount-weighted, projected generationally with scale MP-2019
- Beneficiary males ¹ 101% of Pub-2010 Contingent Survivor male table, headcount-weighted, projected generationally with scale MP-2019
- Beneficiary females ¹ 113% of Pub-2010 Contingent Survivor female table, headcount-weighted, projected generationally with scale MP-2019

¹ The credibility-weighted Pub-2010 Contingent Survivor mortality tables are also applied to spouses and designated beneficiaries while the member is alive.

3. Actuarial Assumptions and Methods

Withdrawal from Service

Withdrawal rates are shown in the Appendix. Withdrawal rates are assumed to cease upon eligibility for retirement. All withdrawal is assumed to result in refund of contributions if non-vested or a deferred annuity if vested.

Disablement Rates

Disablement rates are shown in the Appendix.

Retirement Rates

Retirement rates are shown in the Appendix.

Family Composition

It is assumed that 85% of males and 80% of females are married, with husbands 3 years older than wives. Remarriage rates are not used.

Accrual of Future Service

It is assumed that active members will accrue 1 year of service for each future year of employment.

Noncontributory Service Loadings

The load factor assumptions for non-contributory service (military, parochial or out-of-state teaching, transferred PERS service, and unused sick leave) are as follows:

	<u>Tier 1</u>	<u>Tier 2</u>
• Male – Teachers	7.50%	0.00%
• Male – Non-Teachers	6.00%	0.00%
• Female – Teachers	4.60%	0.00%
• Female – Non-Teachers	4.00%	0.00%

Asset Valuation Method

4-year 25% level smoothing of actuarial gain or (loss) on trust fund return:

- Implemented over 4 years, prospectively commencing July 1, 2016, for the experience for the trust year ending June 30, 2016.
- Actuarial gain or (loss) on assets is calculated as the difference between the expected return under valuation assumptions based on the smoothed Actuarial Value of Assets and the actual trust fund return.
- Actuarial gain or (loss) is recognized at 25% of the original amount each year until fully recognized in the fourth year.
- Total accumulated deferred gain or (loss) amounts are used to adjust the reported Market Value of Assets to determine the Actuarial Value of Assets.

System Contributions

Both employee and employer contributions to the System are assumed to be paid in the middle of the year.

Changes in Assumptions Since the Prior Valuation

The valuation results reflect the pay increase effective July 1, 2022, of \$1,464 per year for Service Personnel and \$2,240 per year for Teachers. This flat-dollar increase was used in the valuation in place of the assumed salary scales for FY 2023.

Appendix – Detailed Assumptions

Salary Scales

Age	Teachers	Non-Teachers and State	Age	Teachers	Non-Teachers and State
19	5.897%	6.501%	45	4.188%	4.477%
20	5.897	6.501	46	4.102	4.403
21	5.897	6.501	47	4.016	4.329
22	5.897	6.374	48	3.931	4.257
23	5.897	6.248	49	3.845	4.184
24	5.897	6.125	50	3.760	4.110
25	5.897	6.000	51	3.674	4.037
26	5.811	5.900	52	3.589	3.962
27	5.727	5.800	53	3.503	3.888
28	5.640	5.727	54	3.468	3.815
29	5.555	5.654	55	3.432	3.743
30	5.468	5.580	56	3.397	3.669
31	5.385	5.506	57	3.352	3.595
32	5.298	5.432	58	3.305	3.522
33	5.213	5.359	59	3.259	3.447
34	5.127	5.285	60	3.213	3.373
35	5.042	5.213	61	3.166	3.301
36	4.956	5.139	62	3.120	3.228
37	4.871	5.065	63	3.074	3.154
38	4.785	4.991	64	3.027	3.081
39	4.700	4.918	65	2.981	3.007
40	4.613	4.844	66	2.935	2.956
41	4.530	4.771	67	2.889	2.905
42	4.443	4.698	68	2.843	2.853
43	4.358	4.624	69	2.796	2.802
44	4.271	4.551	70	2.750	2.750

Appendix – Detailed Assumptions

Withdrawal Rates for Teachers (less than 1 year)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.15000	0.15000	36	0.23000	0.23943	53	0.32714	0.30143
20	0.15000	0.15000	37	0.23571	0.24750	54	0.33286	0.31357
21	0.15000	0.15000	38	0.24143	0.24557	55	0.33857	0.32572
22	0.15000	0.15000	39	0.24714	0.24364	56	0.34429	0.33786
23	0.15571	0.15571	40	0.25286	0.24172	57	0.35000	0.35000
24	0.16143	0.16143	41	0.25857	0.23979	58	0.35000	0.35000
25	0.16714	0.16714	42	0.26429	0.23786	59	0.35000	0.35000
26	0.17286	0.17286	43	0.27000	0.24300	60	0.35000	0.35000
27	0.17857	0.17857	44	0.27571	0.24814	61	0.35000	0.35000
28	0.18429	0.18429	45	0.28143	0.25329	62	0.35000	0.35000
29	0.19000	0.19000	46	0.28714	0.25843	63	0.35000	0.35000
30	0.19571	0.19571	47	0.29286	0.26357	64	0.35000	0.35000
31	0.20143	0.20143	48	0.29857	0.26871	65	0.35000	0.35000
32	0.20714	0.20714	49	0.30429	0.27386	66	0.35000	0.35000
33	0.21286	0.21521	50	0.31000	0.27900	67	0.35000	0.35000
34	0.21857	0.22328	51	0.31571	0.28414	68	0.35000	0.35000
35	0.22429	0.23136	52	0.32143	0.28929	69	0.35000	0.35000

Withdrawal Rates for Teachers (1 to 2 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.16632	0.11000	36	0.14779	0.11000	53	0.12529	0.11000
20	0.16632	0.11000	37	0.14647	0.11000	54	0.12397	0.11000
21	0.16632	0.11000	38	0.14514	0.11000	55	0.12265	0.11000
22	0.16632	0.11000	39	0.14382	0.11000	56	0.12132	0.11000
23	0.16500	0.11000	40	0.14250	0.11000	57	0.12000	0.11000
24	0.16367	0.11000	41	0.14118	0.11000	58	0.12000	0.11000
25	0.16235	0.11000	42	0.13985	0.11000	59	0.12000	0.11000
26	0.16103	0.11000	43	0.13853	0.11000	60	0.12000	0.11000
27	0.15971	0.11000	44	0.13721	0.11000	61	0.12000	0.11000
28	0.15838	0.11000	45	0.13588	0.11000	62	0.12000	0.11000
29	0.15706	0.11000	46	0.13456	0.11000	63	0.12000	0.11000
30	0.15574	0.11000	47	0.13324	0.11000	64	0.12000	0.11000
31	0.15440	0.11000	48	0.13192	0.11000	65	0.12000	0.11000
32	0.15308	0.11000	49	0.13058	0.11000	66	0.12000	0.11000
33	0.15176	0.11000	50	0.12926	0.11000	67	0.12000	0.11000
34	0.15044	0.11000	51	0.12794	0.11000	68	0.12000	0.11000
35	0.14911	0.11000	52	0.12661	0.11000	69	0.12000	0.11000

Appendix – Detailed Assumptions

Withdrawal Rates for Teachers (2 to 3 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.15000	0.14000	36	0.09825	0.08680	53	0.09750	0.07000
20	0.15000	0.14000	37	0.09750	0.08400	54	0.09750	0.07000
21	0.15000	0.14000	38	0.09750	0.08120	55	0.09750	0.07000
22	0.15000	0.14000	39	0.09750	0.07840	56	0.09750	0.07000
23	0.14100	0.13440	40	0.09750	0.07560	57	0.09750	0.07000
24	0.13200	0.12880	41	0.09750	0.07280	58	0.09750	0.07000
25	0.12300	0.12320	42	0.09750	0.07000	59	0.09750	0.07000
26	0.11400	0.11760	43	0.09750	0.07000	60	0.09750	0.07000
27	0.10500	0.11200	44	0.09750	0.07000	61	0.09750	0.07000
28	0.10425	0.10920	45	0.09750	0.07000	62	0.09750	0.07000
29	0.10350	0.10640	46	0.09750	0.07000	63	0.09750	0.07000
30	0.10275	0.10360	47	0.09750	0.07000	64	0.09750	0.07000
31	0.10200	0.10080	48	0.09750	0.07000	65	0.09750	0.07000
32	0.10125	0.09800	49	0.09750	0.07000	66	0.09750	0.07000
33	0.10050	0.09520	50	0.09750	0.07000	67	0.09750	0.07000
34	0.09975	0.09240	51	0.09750	0.07000	68	0.09750	0.07000
35	0.09900	0.08960	52	0.09750	0.07000	69	0.09750	0.07000

Withdrawal Rates for Teachers (3 to 4 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.08000	0.11200	36	0.06240	0.07000	53	0.04500	0.07000
20	0.08000	0.11200	37	0.05880	0.07000	54	0.04500	0.07000
21	0.08000	0.11200	38	0.05784	0.07000	55	0.04500	0.07000
22	0.08000	0.11200	39	0.05688	0.07000	56	0.04500	0.07000
23	0.08128	0.10640	40	0.05592	0.07000	57	0.04500	0.07000
24	0.08256	0.10080	41	0.05496	0.07000	58	0.04500	0.07000
25	0.08384	0.09520	42	0.05400	0.07000	59	0.04500	0.07000
26	0.08512	0.08960	43	0.05100	0.07000	60	0.04500	0.07000
27	0.08640	0.08400	44	0.04800	0.07000	61	0.04500	0.07000
28	0.08160	0.07840	45	0.04500	0.07000	62	0.04500	0.07000
29	0.07680	0.07280	46	0.04500	0.07000	63	0.04500	0.07000
30	0.07200	0.07186	47	0.04500	0.07000	64	0.04500	0.07000
31	0.07080	0.07094	48	0.04500	0.07000	65	0.04500	0.07000
32	0.06960	0.07000	49	0.04500	0.07000	66	0.04500	0.07000
33	0.06840	0.07000	50	0.04500	0.07000	67	0.04500	0.07000
34	0.06720	0.07000	51	0.04500	0.07000	68	0.04500	0.07000
35	0.06600	0.07000	52	0.04500	0.07000	69	0.04500	0.07000

Appendix – Detailed Assumptions

Withdrawal Rates for Teachers (4 to 5 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.09600	0.09000	36	0.07024	0.06300	53	0.04576	0.04050
20	0.09600	0.09000	37	0.06880	0.06002	54	0.04432	0.04050
21	0.09600	0.09000	38	0.06736	0.05700	55	0.04288	0.04050
22	0.09600	0.09000	39	0.06592	0.05400	56	0.04144	0.04050
23	0.09600	0.09000	40	0.06448	0.05102	57	0.04000	0.04050
24	0.09600	0.09000	41	0.06304	0.04800	58	0.04000	0.04050
25	0.09600	0.09000	42	0.06160	0.04500	59	0.04000	0.04050
26	0.08960	0.09000	43	0.06016	0.04410	60	0.04000	0.04050
27	0.08320	0.09000	44	0.05872	0.04320	61	0.04000	0.04050
28	0.08176	0.08702	45	0.05728	0.04230	62	0.04000	0.04050
29	0.08032	0.08400	46	0.05584	0.04140	63	0.04000	0.04050
30	0.07888	0.08100	47	0.05440	0.04050	64	0.04000	0.04050
31	0.07744	0.07802	48	0.05296	0.04050	65	0.04000	0.04050
32	0.07600	0.07500	49	0.05152	0.04050	66	0.04000	0.04050
33	0.07456	0.07200	50	0.05008	0.04050	67	0.04000	0.04050
34	0.07312	0.06902	51	0.04864	0.04050	68	0.04000	0.04050
35	0.07168	0.06600	52	0.04720	0.04050	69	0.04000	0.04050

Withdrawal Rates for Teachers (greater than 5 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.05600	0.06400	36	0.03747	0.03840	53	0.02520	0.02080
20	0.05600	0.06400	37	0.03644	0.03680	54	0.02660	0.02240
21	0.05460	0.06240	38	0.03539	0.03520	55	0.02800	0.02400
22	0.05320	0.06080	39	0.03435	0.03360	56	0.02800	0.02400
23	0.05180	0.05920	40	0.03332	0.03200	57	0.02800	0.02400
24	0.05040	0.05760	41	0.03225	0.03040	58	0.02800	0.02400
25	0.04900	0.05600	42	0.03119	0.02880	59	0.02800	0.02400
26	0.04760	0.05440	43	0.03014	0.02720	60	0.02800	0.02400
27	0.04620	0.05280	44	0.02907	0.02560	61	0.02800	0.02400
28	0.04480	0.05120	45	0.02800	0.02400	62	0.02800	0.02400
29	0.04340	0.04960	46	0.02660	0.02240	63	0.02800	0.02400
30	0.04200	0.04800	47	0.02520	0.02080	64	0.02800	0.02400
31	0.04130	0.04640	48	0.02380	0.01920	65	0.02800	0.02400
32	0.04060	0.04480	49	0.02240	0.01760	66	0.02800	0.02400
33	0.03990	0.04320	50	0.02100	0.01600	67	0.02800	0.02400
34	0.03920	0.04160	51	0.02240	0.01760	68	0.02800	0.02400
35	0.03850	0.04000	52	0.02380	0.01920	69	0.02800	0.02400

Appendix – Detailed Assumptions

Withdrawal Rates for Non-Teachers and State (less than 1 year)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.18000	0.23513	36	0.14160	0.18497	53	0.10080	0.13167
20	0.18000	0.23513	37	0.13920	0.18183	54	0.09840	0.12854
21	0.17760	0.23199	38	0.13680	0.17870	55	0.09600	0.12540
22	0.17520	0.22886	39	0.13440	0.17556	56	0.09360	0.12227
23	0.17280	0.22572	40	0.13200	0.17243	57	0.09120	0.11913
24	0.17040	0.22259	41	0.12960	0.16929	58	0.08880	0.11600
25	0.16800	0.21945	42	0.12720	0.16616	59	0.08640	0.11286
26	0.16560	0.21632	43	0.12480	0.16302	60	0.08400	0.10973
27	0.16320	0.21318	44	0.12240	0.15989	61	0.08400	0.10973
28	0.16080	0.21005	45	0.12000	0.15675	62	0.08400	0.10973
29	0.15840	0.20691	46	0.11760	0.15362	63	0.08400	0.10973
30	0.15600	0.20378	47	0.11520	0.15048	64	0.08400	0.10973
31	0.15360	0.20064	48	0.11280	0.14735	65	0.08400	0.10973
32	0.15120	0.19751	49	0.11040	0.14421	66	0.08400	0.10973
33	0.14880	0.19437	50	0.10800	0.14108	67	0.08400	0.10973
34	0.14640	0.19124	51	0.10560	0.13794	68	0.08400	0.10973
35	0.14400	0.18810	52	0.10320	0.13481	69	0.08400	0.10973

Withdrawal Rates for Non-Teachers and State (1 to 2 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.14950	0.17550	36	0.11040	0.09504	53	0.06900	0.06494
20	0.14950	0.17550	37	0.10580	0.09108	54	0.06900	0.06509
21	0.14720	0.17280	38	0.10120	0.08928	55	0.06900	0.06523
22	0.14490	0.17010	39	0.09660	0.08748	56	0.06670	0.06538
23	0.14260	0.16740	40	0.09200	0.08568	57	0.06440	0.06552
24	0.14030	0.16470	41	0.08970	0.08388	58	0.06210	0.06318
25	0.13800	0.16200	42	0.08740	0.08208	59	0.05980	0.06084
26	0.13570	0.15930	43	0.08510	0.07992	60	0.05750	0.05850
27	0.13340	0.15660	44	0.08280	0.07776	61	0.05750	0.05850
28	0.13110	0.14627	45	0.08050	0.07560	62	0.05750	0.05850
29	0.12880	0.13594	46	0.07820	0.07344	63	0.05750	0.05850
30	0.12650	0.12560	47	0.07590	0.07128	64	0.05750	0.05850
31	0.12420	0.11527	48	0.07360	0.06912	65	0.05750	0.05850
32	0.12190	0.10494	49	0.07130	0.06696	66	0.05750	0.05850
33	0.11960	0.10296	50	0.06900	0.06480	67	0.05750	0.05850
34	0.11730	0.10098	51	0.06900	0.06480	68	0.05750	0.05850
35	0.11500	0.09900	52	0.06900	0.06480	69	0.05750	0.05850

Appendix – Detailed Assumptions

Withdrawal Rates for Non-Teachers and State (2 to 3 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.12500	0.11200	36	0.11280	0.07504	53	0.06000	0.05600
20	0.12500	0.11200	37	0.10800	0.07168	54	0.06000	0.05600
21	0.12500	0.11200	38	0.10320	0.06832	55	0.06000	0.05600
22	0.12500	0.11200	39	0.09840	0.06496	56	0.06000	0.05600
23	0.12500	0.11200	40	0.09360	0.06160	57	0.06000	0.05600
24	0.12500	0.11200	41	0.08880	0.05824	58	0.06000	0.05600
25	0.12500	0.11200	42	0.08400	0.05488	59	0.06000	0.05600
26	0.12500	0.10864	43	0.07920	0.05331	60	0.06000	0.05600
27	0.12500	0.10528	44	0.07440	0.05174	61	0.06000	0.05600
28	0.12500	0.10192	45	0.06960	0.05018	62	0.06000	0.05600
29	0.12500	0.09856	46	0.06480	0.04861	63	0.06000	0.05600
30	0.12500	0.09520	47	0.06000	0.04704	64	0.06000	0.05600
31	0.12500	0.09184	48	0.06000	0.04883	65	0.06000	0.05600
32	0.12500	0.08848	49	0.06000	0.05062	66	0.06000	0.05600
33	0.12500	0.08512	50	0.06000	0.05242	67	0.06000	0.05600
34	0.12500	0.08176	51	0.06000	0.05421	68	0.06000	0.05600
35	0.11760	0.07840	52	0.06000	0.05600	69	0.06000	0.05600

Withdrawal Rates for Non-Teachers and State (3 to 4 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.08000	0.10000	36	0.07200	0.07292	53	0.07000	0.06075
20	0.08000	0.10000	37	0.07000	0.06615	54	0.07000	0.06075
21	0.08000	0.10000	38	0.07000	0.06210	55	0.07000	0.06075
22	0.08000	0.10000	39	0.07000	0.05805	56	0.07000	0.06075
23	0.08000	0.10000	40	0.07000	0.05400	57	0.07000	0.06075
24	0.08000	0.10000	41	0.07000	0.05130	58	0.07000	0.06075
25	0.08000	0.10000	42	0.07000	0.04860	59	0.07000	0.06075
26	0.08000	0.10000	43	0.07000	0.04590	60	0.07000	0.06075
27	0.08000	0.10000	44	0.07000	0.04320	61	0.07000	0.06075
28	0.08000	0.10000	45	0.07000	0.04050	62	0.07000	0.06075
29	0.08000	0.10000	46	0.07000	0.04050	63	0.07000	0.06075
30	0.08000	0.10000	47	0.07000	0.04050	64	0.07000	0.06075
31	0.08000	0.10000	48	0.07000	0.04455	65	0.07000	0.06075
32	0.08000	0.10000	49	0.07000	0.04860	66	0.07000	0.06075
33	0.07800	0.09323	50	0.07000	0.05265	67	0.07000	0.06075
34	0.07600	0.08646	51	0.07000	0.05670	68	0.07000	0.06075
35	0.07400	0.07969	52	0.07000	0.06075	69	0.07000	0.06075

Appendix – Detailed Assumptions

Withdrawal Rates for Non-Teachers and State (4 to 5 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.06750	0.10125	36	0.05175	0.06413	53	0.05175	0.03375
20	0.06750	0.10125	37	0.05175	0.06075	54	0.05175	0.03375
21	0.06525	0.09788	38	0.05175	0.05738	55	0.05175	0.03375
22	0.06300	0.09450	39	0.05175	0.05400	56	0.05175	0.03207
23	0.06075	0.09113	40	0.05175	0.05063	57	0.05175	0.03038
24	0.05850	0.08775	41	0.05175	0.04895	58	0.05175	0.02870
25	0.05625	0.08438	42	0.05175	0.04725	59	0.05175	0.02700
26	0.05625	0.08438	43	0.05175	0.04557	60	0.05175	0.02532
27	0.05625	0.08438	44	0.05175	0.04388	61	0.05175	0.02532
28	0.05625	0.08438	45	0.05175	0.04220	62	0.05175	0.02532
29	0.05625	0.08438	46	0.05175	0.04050	63	0.05175	0.02532
30	0.05625	0.08438	47	0.05175	0.03882	64	0.05175	0.02532
31	0.05400	0.08100	48	0.05175	0.03713	65	0.05175	0.02532
32	0.05175	0.07763	49	0.05175	0.03545	66	0.05175	0.02532
33	0.05175	0.07425	50	0.05175	0.03375	67	0.05175	0.02532
34	0.05175	0.07088	51	0.05175	0.03375	68	0.05175	0.02532
35	0.05175	0.06750	52	0.05175	0.03375	69	0.05175	0.02532

Withdrawal Rates for Non-Teachers and State (greater than 5 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.06600	0.04900	36	0.04711	0.03871	53	0.02901	0.02391
20	0.06600	0.04900	37	0.04567	0.03614	54	0.02795	0.02420
21	0.06435	0.04839	38	0.04344	0.03430	55	0.02688	0.02450
22	0.06270	0.04778	39	0.04122	0.03246	56	0.02582	0.02450
23	0.06105	0.04716	40	0.03899	0.03063	57	0.02475	0.02450
24	0.05940	0.04655	41	0.03787	0.02940	58	0.02475	0.02450
25	0.05775	0.04594	42	0.03676	0.02818	59	0.02475	0.02450
26	0.05610	0.04533	43	0.03564	0.02695	60	0.02475	0.02450
27	0.05445	0.04471	44	0.03453	0.02573	61	0.02475	0.02450
28	0.05413	0.04557	45	0.03341	0.02450	62	0.02475	0.02450
29	0.05381	0.04643	46	0.03231	0.02420	63	0.02475	0.02450
30	0.05349	0.04728	47	0.03119	0.02391	64	0.02475	0.02450
31	0.05317	0.04814	48	0.03008	0.02363	65	0.02475	0.02450
32	0.05285	0.04900	49	0.02896	0.02333	66	0.02475	0.02450
33	0.05141	0.04643	50	0.02785	0.02303	67	0.02475	0.02450
34	0.04998	0.04386	51	0.02896	0.02333	68	0.02475	0.02450
35	0.04854	0.04128	52	0.03008	0.02363	69	0.02475	0.02450

Appendix – Detailed Assumptions

Disability Rates

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.00000	0.00000	33	0.00064	0.00082	47	0.00224	0.00189
20	0.00004	0.00005	34	0.00072	0.00092	48	0.00251	0.00206
21	0.00007	0.00010	35	0.00080	0.00102	49	0.00278	0.00223
22	0.00011	0.00014	36	0.00084	0.00107	50	0.00305	0.00241
23	0.00014	0.00018	37	0.00088	0.00113	51	0.00333	0.00264
24	0.00017	0.00022	38	0.00103	0.00118	52	0.00360	0.00288
25	0.00020	0.00026	39	0.00118	0.00123	53	0.00400	0.00311
26	0.00024	0.00030	40	0.00132	0.00128	54	0.00440	0.00335
27	0.00028	0.00036	41	0.00147	0.00133	55	0.00480	0.00358
28	0.00032	0.00041	42	0.00162	0.00138	56	0.00520	0.00399
29	0.00036	0.00046	43	0.00168	0.00143	57	0.00560	0.00440
30	0.00040	0.00051	44	0.00174	0.00149	58	0.00560	0.00482
31	0.00048	0.00062	45	0.00180	0.00154	59	0.00560	0.00522
32	0.00056	0.00072	46	0.00202	0.00171	60	0.00560	0.00563
						61+	0.00000	0.00000

Retirement Rates

Age	Teachers		Non-Teachers and State	
	Male	Female	Male	Female
54	0.000	0.000	0.000	0.000
55	0.175	0.175	0.200	0.150
56	0.175	0.175	0.200	0.175
57	0.200	0.200	0.175	0.150
58	0.200	0.200	0.200	0.150
59	0.200	0.225	0.150	0.175
60	0.200	0.225	0.125	0.150
61	0.225	0.225	0.125	0.150
62	0.325	0.275	0.300	0.225
63	0.225	0.250	0.225	0.175
64	0.250	0.225	0.150	0.175
65	0.325	0.300	0.300	0.275
66	0.275	0.350	0.225	0.275
67	0.225	0.300	0.225	0.225
68	0.250	0.300	0.225	0.225
69	0.250	0.300	0.225	0.225
70+	1.000	1.000	1.000	1.000