



West Virginia Teachers' Retirement System

Actuarial Valuation as of July 1, 2021

April 2022



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

April 1, 2022

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, 2021. This valuation presents the liabilities of the System as of the valuation date and the projected Employer contribution for fiscal year 2023.

The valuation results indicate:

- The State contribution to TRS for fiscal year 2023 is \$391,983,000. The State appropriation needed for fiscal year 2023 for the Teachers' Retirement Plans (TRS and TDC) under the School Aid Formula is \$360,618,000.
- The funded percentage of the actuarial accrued liability at the valuation date is 76.0% (on an actuarial value of assets basis), compared to 72.8% for the prior year.

The valuation assumptions for the discount rate, inflation and salary scales were changed to reflect the recent experience study covering the economic assumptions for July 1, 2015 to June 30, 2020. The impact of these assumption changes on the System's accrued liability is quantified in Table 3a.

This report presents fairly the actuarial position of the West Virginia Teachers' Retirement System (TRS) as of July 1, 2021 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 experience and represent our best estimate of anticipated future experience of TRS. The assumptions were developed in accordance with the guidance set forth in applicable Actuarial Standards of Practice, including ASOPs 27 and 35. The mortality assumptions were developed in accordance with the recommendation that an appropriate margin for future improvement in mortality beyond the measurement date be included. The valuation is based on membership data as of June 30, 2021, 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.

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. ASOP 51 requires certain disclosures of potential risks to the system and provides useful information for intended users of actuarial reports who determine plan 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.

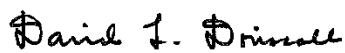
Where presented, the “funded percentage” and “unfunded accrued liability” are typically measured using the actuarial value of assets. Use of the market value of assets instead would result in different funded percentages and unfunded accrued liabilities. Moreover, the funded percentage presented is appropriate for evaluating the need and level of future contributions but makes no assessment regarding the funded status of the plan if the plan 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. 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 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 plan 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.

Valuation results presented in this report are developed for use by the West Virginia Consolidated Public Retirement Board for determining the progress and needs for the funding of the system. Use of this report by other parties or for any other purpose 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 should be asked to review any statement to be made on the basis of the results contained in this report. Buck will accept no liability for any such statement made without such prior review. Measurements made for financial reporting purposes under GASB Statements Nos. 67 and 68 are reported separately.

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



David L. Driscoll, FSA, EA, MAAA, FCA
Principal, Consulting Actuary



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

Contents

- 1. Summary of Valuation 1
- 2. Summary of System Provisions.....21
- 3. Actuarial Assumptions and Methods25
- Appendix – Detailed Assumptions27

1. Summary of Valuation

This report presents the results of the July 1, 2021, actuarial valuation of the West Virginia Teachers' Retirement System and includes the projected employer contribution requirement for FY 2023. 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 2023 for West Virginia's Teachers Retirement Plans under the School Aid Formula (SAF), which is determined to be \$360,618,000. 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 2023.

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 2023 are shown in Table 1.

The State's TRS contribution for FY 2023, 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 2023, the only separate amortization is for HB 3095.

The total State TRS contribution on this basis is \$391,983,000.

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 plan 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 plan 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 2023 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.

Comments on Valuation Results

Table 1 presents the development of the valuation results as of July 1, 2021, and, for comparison purposes, July 1, 2020. Table 2 presents the development of the School Aid Formula appropriation for FY 2023.

Table 3a presents the development of the actuarial gain/(loss) as of July 1, 2021. 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). Effective July 1, 2021, the valuation assumptions for the interest rate, inflation rate, and salary scales were changed to reflect the recent experience study covering the economic assumptions for July 1, 2015 to June 30, 2020. These assumption changes increased the unfunded liability by \$237 million.

The expected unfunded actuarial accrued liability as of July 1, 2021 was \$3.139 billion. The actual unfunded liability at the valuation date is \$2.755 billion, a decrease of \$0.384 billion. The decrease in the unfunded liability was primarily due to the following:

- The return on assets for the year ending June 30, 2021 was approximately 31.6% on a market value basis and 12.3% on an actuarial value basis. The return on the actuarial value basis was greater than the prior year's valuation assumption of 7.50% and decreased the unfunded liability by approximately \$385 million.
- The demographic and salary experience resulted in a net liability loss of approximately \$1 million, which is 0.01% 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 13-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 plan 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 plan contributions are expected to increase as a percent of pay until the plan 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, 2021	July 1, 2020
Actives	35,113	34,753
Retirees and Beneficiaries	37,282	36,797
Terminated Vested	2,919	3,038
Terminated Non-Vested	<u>5,319</u>	<u>5,192</u>
Total	80,633	79,780

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, 2021.

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, 2021	July 1, 2020
1. Present Value of Future Benefits		
a. Active	\$ 4,780,788	\$ 4,632,540
b. Inactive - Retirees	7,530,645	7,280,522
- Disabled Retirees	199,453	200,943
- Beneficiaries	295,203	271,139
- Vested Terminated	128,313	134,461
- Non-Vested Terminated	23,975	22,356
c. Total	\$ 12,958,377	\$ 12,541,961
2. Actuarial Accrued Liability	\$ 11,495,184	\$ 11,154,850
3. Actuarial Value of Assets	8,740,204	8,116,332
4. Unfunded Actuarial Accrued Liability (UAL)	\$ 2,754,980	\$ 3,038,518
5. Annual Normal Cost Rate: Type 1 (Pre 7/1/1991 Group)		
a. Present Value of Future Normal Costs	\$ 24,487	\$ 32,420
b. Present Value of Future Pay	\$ 237,974	\$ 327,649
c. Normal Cost Rate as a % of Payroll	10.29%	9.89%
d. Employee share	6.00%	6.00%
e. Employer share	4.29%	3.89%
f. TRS FY 2022 (2021) Normal Cost Payroll	\$ 81,431	\$ 107,536
g. Employer FY 2022 (2021) Normal Cost (BOY)	\$ 3,493	\$ 4,183
h. TRS FY 2023 (2022) Normal Cost Payroll	\$ 61,649	\$ 83,776
i. Employer FY 2023 (2022) Normal Cost (BOY)	\$ 2,645	\$ 3,259
6. Annual Normal Cost Rate: Type 3 (Post 6/30/2005 Group)		
a. Present Value of Future Normal Costs	\$ 1,438,707	\$ 1,354,691
b. Present Value of Future Pay	\$ 14,320,405	\$ 13,761,706
c. Normal Cost Rate as a % of Payroll	10.05%	9.84%
d. Employee share	6.00%	6.00%
e. Employer share	4.05%	3.84%
f. TRS FY 2022 (2021) Normal Cost Payroll	\$ 1,554,980	\$ 1,499,032
g. Employer FY 2022 (2021) Normal Cost (BOY)	\$ 62,977	\$ 57,563
h. TRS FY 2023 (2022) Normal Cost Payroll	\$ 1,636,288	\$ 1,583,184
i. Employer FY 2023 (2022) Normal Cost (BOY)	\$ 66,270	\$ 60,794

1. Summary of Valuation

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

Valuation Date	July 1, 2021	July 1, 2020
7. Employer Contribution for FY 2022 and FY 2023, (FY 2021 and FY 2022), assumes mid-year contribution:		
a. FY 2022 (2021)	FY 2022	FY 2021
i. TRS and TDC Payroll	\$ 1,758,704	\$ 1,735,464
ii. FY 2022 (2021) TRS Contribution		
A. Normal Cost	68,837	64,020
B. Amortization components:		
- Original UAL over 40 years as a level-dollar amount	322,390	344,708
- H.B. 3095, over 6 years from 7/1/2019	1,064	1,068
C. Total	\$ 392,291	\$ 409,796
iii. FY 2022 (2021) Contribution as a % of Payroll	22.31%	23.61%
b. FY 2023 (2022)	FY 2023	FY 2022
i. TRS and TDC Payroll	\$ 1,814,982	\$ 1,790,999
ii. FY 2023 (2022) TRS Contribution		
A. Normal Cost	71,369	66,412
B. Amortization components:		
- Original UAL over 40 years as a level-dollar amount	319,550	344,644
- H.B. 3095, over 6 years from 7/1/2019	1,064	1,068
C. Total	\$ 391,983	\$ 412,124
iii. FY 2023 (2022) Contribution as a % of Payroll	21.60%	23.01%
iv. FY 2023 (2022) SAF appropriation ¹	\$ 360,618	\$ 383,628
v. FY 2023 (2022) SAF appropriation as a % of Payroll	19.87%	21.42%

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 2023 (000's omitted)

TRs Contribution for FY 2023	\$ 390,919
+ 7.50% x School Aid Formula (TDC only) ¹	6,455
- 15.0% x County Portion of the Old Group TRS payroll ²	(2,509)
- 7.5% x County Portion of the New Group TRS payroll ³	(33,264)
- Fire Tax Per Code Section 33-3-14(d)	(2,813)
+ State payment equal to TDC forfeitures ⁴	<u>766</u>
Subtotal of Standard SAF Appropriation	\$ 359,554
Special Payments for Benefit Improvements under H.B. 3095	<u>1,064</u>
Total FY 2023 SAF Appropriation	\$ 360,618

¹ School Aid Formula for TDC only is 72.34% of FY 2023 TDC pay for County employees plus FY 2023 TDC pay for State employees = 72.34% x \$111,998 + \$5,047 = \$86,066.

² County portion of the Old Group TRS payroll is 27.66% of FY 2023 TRS pay for County employees = 27.66% x \$60,466 = \$16,725.

³ County portion of the New Group TRS payroll is 27.66% of FY 2023 TRS pay for County employees = 27.66% x \$1,603,452 = \$443,515.

⁴ Actual amount to be released from the TDC suspense account at 6/30/2021 per Code Section 18-7A-18a(b).

1. Summary of Valuation

Table 3a
Actuarial Gain/(Loss) as of July 1, 2021 (000's omitted)

	Amount
1. Expected Actuarial Accrued Liability	
a. Actuarial Accrued Liability as of July 1, 2020	\$ 11,154,850
b. Normal Cost	158,140
c. Interest on (a) and (b) at 7.50%	848,475
d. Benefit Payments and Transfers	(871,667)
e. Interest on (d) at 7.50%, Adjusted for Timing	(32,097)
f. Assumption Changes	236,502
g. Plan Changes	0
h. Expected Actuarial Accrued Liability as of July 1, 2021	<u>\$ 11,494,203</u>
2. Actual Actuarial Accrued Liability as of July 1, 2021	\$ 11,495,184
3. Liability Gain/(Loss): (1h) - (2)	\$ (981)
4. Expected Actuarial Asset Value	
a. Actuarial Value of Assets as of July 1, 2020	\$ 8,116,332
b. Interest on (a) at 7.50%	608,725
c. Member Contributions	97,258
d. Employer Contributions	417,334
e. Interest on (c) and (d) at 7.50%, Adjusted for Timing	18,948
f. Benefit Payments and Transfers	(871,667)
g. Interest on (f) at 7.50%, Adjusted for Timing	(32,097)
h. Expected Actuarial Asset Value as of July 1, 2021	<u>\$ 8,354,833</u>
5. Actual Actuarial Asset Value as of July 1, 2021	\$ 8,740,204
6. Actuarial Asset Value Gain/(Loss): (5) - (4h)	\$ 385,371
7. Total Actuarial Gain/(Loss): (3) + (6)	\$ 384,390

1. Summary of Valuation

Table 3b

Change in Unfunded Liability during FY 2021 (000's omitted)

	Amount
1. Unfunded Liability as of July 1, 2020	\$ 3,038,518
a. Interest on Unfunded Liability at 7.50%	\$ 227,889
b. Normal Cost	158,140
c. Member Contributions	(97,258)
d. Employer Contributions	(417,334)
e. Interest on (b) through (d) at 7.50%, Adjusted for Timing	(7,087)
f. Assumption Changes	236,502
g. Plan Changes	<u>0</u>
h. Expected Change in Unfunded Liability during FY 2021	\$ 100,852
2. Expected Unfunded Liability as of July 1, 2021: (1) + (1h)	\$ 3,139,370
a. Liability (Gain)/Loss during FY 2021	\$ 981
b. Actuarial Assets (Gain)/Loss during FY 2021	<u>(385,371)</u>
c. Total Actuarial (Gain)/Loss during FY 2021	\$ (384,390)
3. Actual Unfunded Liability as of July 1, 2021: (2) + (2c)	\$ 2,754,980

1. Summary of Valuation

Table 3c

Liability Gain/(Loss) by Source as of July 1, 2021 (000's omitted)

	Gain/(Loss)
1. Demographic and Salary Experience	
a. Retirement Experience	\$ (12,821)
b. Termination Experience	(15,803)
c. Disability Experience	(1,054)
d. Active Mortality Experience	3,180
e. Inactive Mortality Experience	(28,467)
f. Salary Increases	43,344
g. New Entrants and Rehires	(15,235)
h. Benefit Payments Different Than Expected	4,455
i. Miscellaneous ¹	21,420
j. Total	<u>\$ (981)</u>
2. Assumption Changes	\$ (236,502)
3. Plan Changes	\$ 0
4. Total	\$ (237,483)

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
2022	\$ 2,751,268	\$ 3,379	\$ 63,033	\$ 81,431	\$ 1,554,980	\$ 1,758,704	19.79%	\$ 348,023	3.58%	\$ 63,033
2023	2,593,816	2,739	68,630	61,649	1,636,288	1,814,982	17.76%	322,289	3.78%	68,630
2024	2,450,937	2,209	71,797	49,725	1,711,802	1,873,062	17.18%	321,759	3.83%	71,797
2025	2,297,699	1,755	74,989	39,515	1,787,909	1,933,000	16.62%	321,305	3.88%	74,989
2026	2,133,351	1,368	78,210	30,787	1,864,697	1,994,856	16.09%	320,918	3.92%	78,210
2027	1,957,088	1,062	81,451	23,885	1,941,983	2,058,691	15.57%	320,612	3.96%	81,451
2028	1,768,046	799	84,726	17,998	2,020,058	2,124,569	15.08%	320,349	3.99%	84,726
2029	1,565,298	592	88,051	13,328	2,099,332	2,192,555	14.60%	320,142	4.02%	88,051
2030	1,347,851	431	91,427	9,689	2,179,829	2,262,717	14.14%	319,981	4.04%	91,427
2031	1,114,639	308	94,875	6,925	2,262,030	2,335,124	13.70%	319,858	4.06%	94,875
2032	864,519	217	98,386	4,890	2,345,720	2,409,848	13.27%	319,767	4.08%	98,386
2033	596,266	146	101,984	3,285	2,431,529	2,486,963	12.85%	319,696	4.10%	101,984
2034	308,564	97	105,664	2,183	2,519,259	2,566,546	12.45%	319,647	4.12%	105,664

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
2022	\$ 2,751,268	\$ 199,467	\$ 344,644	\$ 157,452
2023	2,593,816	188,052	319,550	142,879
2024	2,450,937	177,693	319,550	153,238
2025	2,297,699	166,583	319,550	164,348
2026	2,133,351	154,668	319,550	176,263
2027	1,957,088	141,889	319,550	189,042
2028	1,768,046	128,183	319,550	202,748
2029	1,565,298	113,484	319,550	217,447
2030	1,347,851	97,719	319,550	233,212
2031	1,114,639	80,811	319,550	250,120
2032	864,519	62,678	319,550	268,253
2033	596,266	43,229	319,550	287,702
2034	308,564	22,371	319,550	308,560

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 2022 Through FY 2034 (000's omitted)

FY Ending 6/30	MV Assets Beg. of Year	Expected Contributions	Benefits	Earnings	Net Income	MV Assets End of Year
2022	\$ 9,914,787	\$ 510,305	\$ (925,919)	\$ 704,020	\$ 288,406	\$ 10,203,193
2023	10,203,193	479,969	(910,928)	724,383	293,424	10,496,617
2024	10,496,617	475,033	(917,641)	745,241	302,633	10,799,250
2025	10,799,250	470,751	(923,088)	766,835	314,498	11,113,748
2026	11,113,748	465,843	(926,178)	789,352	329,017	11,442,765
2027	11,442,765	462,229	(928,948)	812,978	346,259	11,789,024
2028	11,789,024	458,562	(930,835)	837,884	365,611	12,154,635
2029	12,154,635	454,689	(932,288)	864,201	386,602	12,541,237
2030	12,541,237	450,703	(933,177)	892,056	409,582	12,950,819
2031	12,950,819	446,545	(934,343)	921,561	433,763	13,384,582
2032	13,384,582	442,218	(936,315)	952,785	458,688	13,843,270
2033	13,843,270	437,808	(938,390)	985,808	485,226	14,328,496
2034	14,328,496	433,343	(939,607)	1,020,785	514,521	14,843,017

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, 2021 (000's omitted)

	June 30, 2021	June 30, 2020
Assets		
Cash with State Treasurer	\$ 2,457	\$ 1,690
Investments at Fair Value	9,886,657	7,820,075
Contributions Receivable	24,697	21,585
Participant Loans Receivable	998	1,234
Miscellaneous Revenue Receivable	13	-
Total Assets	<u>\$ 9,914,822</u>	<u>\$ 7,844,584</u>
Liabilities		
Accrued Expenses and Other Payables	<u>35</u>	<u>256</u>
Market Value of Assets	\$ 9,914,787	\$ 7,844,328
Adjustment for Deferred Gains / (Losses)	<u>1,174,583</u>	<u>(272,004)</u>
Actuarial Value of Assets	\$ 8,740,204	\$ 8,116,332

Table 7b
Four-Year Asset Smoothing as of June 30, 2021 (000's omitted)

FY Ending 6/30	Gain/(Loss) on Actuarial Value of Assets	Percent Deferred	Gain/(Loss) Deferred as of June 30, 2021	Gain/(Loss) Recognized for FY ending June 30, 2021
2021	\$ 1,829,013	75%	\$ 1,371,760	\$ 457,253
2020	(337,250)	50%	(168,625)	(84,313)
2019	(114,208)	25%	(28,552)	(28,552)
2018	152,152	0%	-	38,038
			<u>\$ 1,174,583</u>	<u>\$ 382,426</u>

1. Summary of Valuation

Table 8

Statement of Changes in Market Value of Assets for Year ended June 30, 2021 (000's omitted)

Market Value of Assets - Beginning of Year	\$	7,844,328
Post Valuation Adjustment		-
Market Value of Assets - After Adjustment	\$	7,844,328
Additions:		
Contributions:		
Member	\$	97,258
Employer		129,803
School Aid Formula		267,531
Make Up Contributions		-
Special Appropriations		20,000
Voluntary Special Contribution Members		-
Special Contribution Required Employers		-
Contribution Delinquency Fees		-
§33-3-14(d) Fees		-
Subtotal	\$	514,592
Investment Income:		
Net Appreciation in Fair Value ¹		2,429,803
Investment income		8
Subtotal	\$	2,429,811
Transfers from plans		20
Other Income		2,944
Total	\$	2,947,367
Deductions and Transfers:		
Benefit Expense	\$	863,132
Refunds of Contributions		8,384
Administrative Expenses		5,221
Transfers to plans		171
Total	\$	876,908
Net Increase	\$	2,070,459
Market Value of Assets - End of Year	\$	9,914,787
Investment Return for Year:		
Valuation purposes (assumes mid-year transactions and offsets investment income by investment and administrative expenses)		31.62%
Per Investment Management Board (time-weighted, excluding administrative expense)		32.0%

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, 2020	34,753	5,192	3,038	31,831	2,117	2,849	79,780
New Entrants	2,294	87	-	-	-	372	2,753
Returned to Active Status	362	(222)	(140)	-	-	-	-
Terminated Non-Vested	(468)	468	-	-	-	-	-
Terminated Vested	(321)	-	321	-	-	-	-
Withdrew Contributions	(154)	(167)	(107)	-	-	-	(428)
Retired	(1,266)	-	(159)	1,425	-	-	-
Disabled	(23)	-	(27)	-	50	-	-
Deceased	(55)	(19)	(15)	(1,074)	(98)	(187)	(1,448)
Certain Period Expired	-	-	-	-	-	(7)	(7)
Adjustments	(9)	(20)	8	-	-	4	(17)
Census as of July 1, 2021	35,113	5,319	2,919	32,182	2,069	3,031	80,633

1. Summary of Valuation

Table 10
Summary of Membership

	July 1, 2021 Valuation	July 1, 2020 Valuation
Active Members:		
Teachers	20,873	20,664
Non-Teachers (including State)	14,240	14,089
Total	<u>35,113</u>	<u>34,753</u>
Inactive Members:		
Service Retirees	32,182	31,831
Disabled Retirees	2,069	2,117
Beneficiaries	3,031	2,849
Vested Terminated	2,919	3,038
Non-Vested Terminated	5,319	5,192
Total	<u>45,520</u>	<u>45,027</u>
Total Members	80,633	79,780

1. Summary of Valuation

Table 11(a)
Distribution of the Number and Total Annual Compensation of Active Teachers as of July 1, 2021

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	591 25,032,654									591 25,032,654
25 - 29	1,666 74,357,402	533 25,627,882								2,199 99,985,284
30 - 34	744 34,346,147	1,614 81,128,884	341 18,182,905							2,699 133,657,936
35 - 39	583 27,671,113	952 49,164,291	1,413 78,128,224	259 15,119,632						3,207 170,083,260
40 - 44	565 27,004,183	735 38,609,130	881 49,491,463	940 56,261,144	102 6,458,303					3,223 177,824,223
45 - 49	433 21,007,037	548 29,012,299	598 33,767,518	536 32,606,795	530 33,635,102	54 3,706,350				2,699 153,735,101
50 - 54	340 17,274,469	421 22,534,771	519 29,423,910	455 27,499,021	433 28,027,210	350 23,779,048	128 8,761,998			2,646 157,300,427
55 - 59	200 10,293,966	262 14,436,618	337 19,526,938	308 18,797,313	275 17,740,028	194 13,113,684	364 25,605,056	142 10,269,666		2,082 129,783,269
60 - 64	106 5,634,928	143 8,175,455	172 10,072,430	152 9,257,511	131 8,334,640	75 4,981,273	104 7,412,969	148 10,853,881	41 2,983,511	1,072 67,706,598
65 - 69	33 1,829,918	56 3,131,310	49 2,802,625	64 3,940,177	31 2,040,207	26 1,752,766	26 1,808,826	20 1,530,515	52 4,350,298	357 23,186,642
70 & over	15 906,587	13 794,918	10 584,836	14 908,762	3 191,071	4 296,738	10 721,221	11 991,417	18 1,329,401	98 6,724,951
Total	5,276 245,358,404	5,277 272,615,558	4,320 241,980,849	2,728 164,390,355	1,505 96,426,561	703 47,629,859	632 44,310,070	321 23,645,479	111 8,663,210	20,873 1,145,020,345

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, 2021

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	161 4,357,900	2 64,682								163 4,422,582
25 - 29	348 9,842,286	86 2,871,636								434 12,713,922
30 - 34	446 12,071,665	224 7,911,613	46 2,394,228							716 22,377,506
35 - 39	543 15,011,831	286 9,743,914	190 9,522,975	46 2,849,707						1,065 37,128,427
40 - 44	658 17,961,066	476 14,840,307	299 11,878,682	181 10,124,980	23 1,484,007	2 88,046				1,639 56,377,088
45 - 49	617 16,980,601	603 18,578,286	416 14,828,504	254 11,039,885	122 6,625,894	25 1,495,477	1 50,555			2,038 69,599,202
50 - 54	580 15,657,849	611 18,625,614	587 20,416,769	383 14,460,184	212 10,556,589	93 5,219,918	49 2,969,864	2 103,119		2,517 88,009,906
55 - 59	482 13,415,709	552 16,774,082	572 19,083,736	503 17,970,966	331 13,445,282	146 6,896,042	113 6,925,688	65 4,332,496	4 192,400	2,768 99,036,401
60 - 64	293 7,920,302	378 11,025,503	382 12,056,550	332 11,304,289	253 9,799,852	131 5,815,293	85 4,441,912	66 4,730,499	50 3,093,799	1,970 70,187,999
65 - 69	106 2,728,027	144 4,108,279	103 3,445,770	98 3,408,938	87 3,207,049	44 1,898,537	25 1,095,031	12 684,128	25 1,361,029	644 21,936,788
70 & over	51 1,247,193	54 1,527,911	53 1,614,048	40 1,275,400	29 1,021,153	9 467,552	22 962,837	7 283,514	21 1,201,274	286 9,600,882
Total	4,285 117,194,429	3,416 106,071,827	2,648 95,241,262	1,837 72,434,349	1,057 46,139,826	450 21,880,865	295 16,445,887	152 10,133,756	100 5,848,502	14,240 491,390,703

1. Summary of Valuation

Table 12
Distribution of the Number and Average Monthly Benefits of Retired Participants as of July 1, 2021

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	-	-	-	-	-	-	13	27	1,274	13	27	1,274
35 - 39	-	-	-	2	37	737	12	37	1,120	14	37	1,065
40 - 44	-	-	-	11	42	885	19	43	1,268	30	43	1,128
45 - 49	-	-	-	21	47	745	36	47	817	57	47	791
50 - 54	9	54	2,646	63	52	941	56	52	873	128	52	1,031
55 - 59	698	58	3,109	205	57	1,082	111	57	948	1,014	58	2,463
60 - 64	3,792	62	2,573	369	62	1,030	207	62	1,211	4,368	62	2,378
65 - 69	7,928	67	2,438	449	67	1,060	382	67	1,257	8,759	67	2,316
70 - 74	8,758	72	2,248	479	72	949	571	72	1,328	9,808	72	2,131
75 - 79	4,760	77	1,851	291	77	867	479	77	1,154	5,530	77	1,739
80 - 84	3,073	82	1,465	140	81	680	469	82	980	3,682	82	1,374
85 - 89	1,924	87	1,227	30	86	484	349	87	934	2,303	87	1,173
90 - 94	946	92	1,040	6	92	422	236	92	830	1,188	92	995
95 & over	294	97	902	3	98	359	91	98	660	388	97	841
Total	32,182	73	2,110	2,069	68	959	3,031	75	1,096	37,282	73	1,963
Total Annual Benefits			814,701,517			23,804,012			39,858,158			878,363,687

1. Summary of Valuation

Table 13
Distribution of the Number and Average Monthly Benefits
of Participants Entitled to Deferred Benefits as of July 1, 2021

Current Age	Deferred Vested		
	Count	Avg. Age	Avg. Mo. Benefit
under 35	287	32	445
35 - 39	436	37	556
40 - 44	387	42	625
45 - 49	356	47	685
50 - 54	434	52	696
55 - 59	583	57	741
60 - 64	344	61	623
65 - 69	80	66	497
70 - 74	11	70	481
75 - 79	1	77	247
80 & over	-	-	-
Total	2,919	48	634
Total Annual Benefits			22,202,274

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 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 Plan Provisions Since the Prior Valuation

None.

3. Actuarial Assumptions and Methods

Valuation Date

July 1, 2021

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

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 interest rate was lowered from 7.50% to 7.25%. The inflation rate was lowered from 3.00% to 2.75%. The salary scales were lowered to reflect the revised inflation assumption.

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