



# West Virginia Teachers' Retirement System

## Actuarial Valuation as of July 1, 2020

March 2021



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

March 31, 2021

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, 2020. This valuation presents the liabilities of the System as of the valuation date and the projected Employer contribution for fiscal year 2022.

The valuation results indicate:

- The State contribution to TRS for fiscal year 2022 is \$412,124,000. The State appropriation needed for fiscal year 2022 for the Teachers' Retirement Plans (TRS and TDC) under the School Aid Formula is \$383,628,000.
- The funded percentage of the actuarial accrued liability at the valuation date is 72.8% (on an actuarial value of assets basis), compared to 71.1% for the prior year.

The valuation assumptions for mortality, withdrawal rates, disability rates, retirement rates, salary scales, and non-contributory service loads were changed to reflect the most recent experience study.

This report contains supporting data and background information pertaining to the development of costs and related liabilities of the System. The valuation is based on membership data as of June 30, 2020, 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 presents fairly the actuarial position of the West Virginia Teachers' Retirement System (TRS) as of July 1, 2020 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.

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.

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 funding purposes only. Measurements made for financial reporting purposes under GASB Statements Nos. 67 and 68 are reported separately.

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 will be developed by the Board Actuary and reported separately.

Use of this report 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 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.

I am a Fellow of the Society of Actuaries and a Member of the American Academy of Actuaries. I 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 I am available to answer questions about it.

Buck Global, LLC

*David L. Driscoll*

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

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# 1. Summary of Valuation

This report presents the results of the July 1, 2020, actuarial valuation of the West Virginia Teachers' Retirement System and includes the projected employer contribution requirement for FY 2022. 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 2022 for West Virginia's Teachers Retirement Plans under the School Aid Formula (SAF), which is determined to be \$383,628,000. 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 2022.

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 2022 are shown in Table 1.

The State's TRS contribution for FY 2022, 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 2022, the only separate amortization is for HB 3095.

The total State TRS contribution on this basis is \$412,124,000.

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 3 and 4.

The projected TDC contribution for FY 2022 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, 2020, and, for comparison purposes, July 1, 2019. Based on the prior year's projections, the expected unfunded actuarial accrued liability as of July 1, 2020 was \$3.043 billion. The actual unfunded liability at the valuation date is \$3.039 billion, a decrease of \$0.005 billion.

The decrease in the unfunded liability was primarily due to the following:

- The return on assets for the year ending June 30, 2020 was approximately 3.0% on a market value basis and 8.1% on an actuarial value basis. The return on the actuarial value basis was greater than to the prior year's valuation assumption of 7.50% and decreased the unfunded liability by approximately \$48 million.
- Assumption changes effective July 1, 2020 for mortality, withdrawal rates, disability rates, retirement rates, salary scale, and non-contributory service loads increased the unfunded liability by approximately \$24 million.
- Contributions greater than expected decreased the unfunded liability by approximately \$55 million.
- The combined impact of turnover, mortality, and retirement experience increased the unfunded liability by approximately \$74 million.

Tables 3 and 4 present projections of the unfunded accrued liability, net of any separately funded liability, to June 30, 2034. Table 3 illustrates the expected pattern of change in the unfunded liability over the remaining 14-year period. The unfunded liability is expected to decrease steadily to zero at the end of the period. Table 4 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 5 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 7.5% with an underlying inflation assumption of 3.0%.

# 1. Summary of Valuation

## System Membership

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

Group	July 1, 2020	July 1, 2019
Actives	34,753	34,108
Retirees and Beneficiaries	36,797	36,652
Terminated Vested	3,038	2,983
Terminated Non-Vested	<u>5,192</u>	<u>5,188</u>
Total	79,780	78,931

Table 8 presents a reconciliation of system membership over the year and Table 9 presents supplemental information on system membership.

Tables 10(a) and 10(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, 2020.

Table 11 shows the number and average monthly benefits of retirees and beneficiaries included in the valuation distributed by fifth age group. Table 12 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, 2020	July 1, 2019
1. Present Value of Future Benefits		
a. Active	\$ 4,632,540	\$ 4,588,990
b. Inactive - Retirees	7,280,522	7,232,133
- Disabled Retirees	200,943	206,291
- Beneficiaries	271,139	268,095
- Vested Terminated	134,461	126,633
- Non-Vested Terminated	22,356	21,011
c. Total	\$ 12,541,961	\$ 12,443,153
2. Actuarial Accrued Liability	\$ 11,154,850	\$ 10,951,502
3. Actuarial Value of Assets	8,116,332	7,788,482
4. Unfunded Actuarial Accrued Liability (UAL)	\$ 3,038,518	\$ 3,163,020
5. Annual Normal Cost Rate: <b>Type 1 (Pre 7/1/1991 Group)</b>		
a. Present Value of Future Normal Costs	\$ 32,420	\$ 41,338
b. Present Value of Future Pay	\$ 327,649	\$ 391,270
c. Normal Cost Rate as a % of Payroll	9.89%	10.57%
d. Employee share	6.00%	6.00%
e. Employer share	3.89%	4.57%
f. TRS FY 2021 (2020) Normal Cost Payroll	\$ 107,536	\$ 125,360
g. Employer FY 2021 (2020) Normal Cost (BOY)	\$ 4,183	\$ 5,729
h. TRS FY 2022 (2021) Normal Cost Payroll	\$ 83,776	\$ 99,082
i. Employer FY 2022 (2021) Normal Cost (BOY)	\$ 3,259	\$ 4,528
6. Annual Normal Cost Rate: <b>Type 3 (Post 6/30/2005 Group)</b>		
a. Present Value of Future Normal Costs	\$ 1,354,691	\$ 1,450,313
b. Present Value of Future Pay	\$ 13,761,706	\$ 13,894,071
c. Normal Cost Rate as a % of Payroll	9.84%	10.44%
d. Employee share	6.00%	6.00%
e. Employer share	3.84%	4.44%
f. TRS FY 2021 (2020) Normal Cost Payroll	\$ 1,499,032	\$ 1,382,817
g. Employer FY 2021 (2020) Normal Cost (BOY)	\$ 57,563	\$ 61,397
h. TRS FY 2022 (2021) Normal Cost Payroll	\$ 1,583,184	\$ 1,466,206
i. Employer FY 2022 (2021) Normal Cost (BOY)	\$ 60,794	\$ 65,100



# 1. Summary of Valuation

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

Valuation Date	July 1, 2020	July 1, 2019
7. Employer Contribution for FY 2021 and FY 2022, (FY 2020 and FY 2021), assumes mid-year contribution:		
a. FY 2021 (2020)	FY 2021	FY 2020
i. TRS and TDC Payroll	\$ 1,735,464	\$ 1,642,129
ii. FY 2021 (2020) TRS Contribution		
A. Normal Cost	64,020	69,598
B. Amortization components:		
- Original UAL over 40 years as a level-dollar amount	344,708	345,036
- H.B. 3095, over 6 years from 7/1/2019	1,068	1,068
C. Total	\$ 409,796	\$ 415,702
iii. FY 2021 (2020) Contribution as a % of Payroll	23.61%	25.31%
b. FY 2022 (2021)	FY 2022	FY 2021
i. TRS and TDC Payroll	\$ 1,790,999	\$ 1,694,677
ii. FY 2022 (2021) TRS Contribution		
A. Normal Cost	66,412	72,192
B. Amortization components:		
- Original UAL over 40 years as a level-dollar amount	344,644	345,234
- H.B. 3095, over 6 years from 7/1/2019	1,068	1,068
C. Total	\$ 412,124	\$ 418,494
iii. FY 2022 (2021) Contribution as a % of Payroll	23.01%	24.69%
iv. FY 2022 (2021) SAF appropriation <sup>1</sup>	\$ 383,628	\$ 391,239
v. FY 2022 (2021) SAF appropriation as a % of Payroll	21.42%	23.09%

<sup>1</sup> 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 2022 (000's omitted)**

TRS Contribution for FY 2022	\$ 411,056
+ 7.50% x School Aid Formula (TDC only) <sup>1</sup>	6,992
- 15.0% x County Portion of the Old Group TRS payroll <sup>2</sup>	(3,219)
- 7.5% x County Portion of the New Group TRS payroll <sup>3</sup>	(30,262)
- Fire Tax Per Code Section 33-3-14(d)	(3,108)
+ State payment equal to TDC forfeitures <sup>4</sup>	<u>1,101</u>
Subtotal of Standard SAF Appropriation	\$ 382,560
Special Payments for Benefit Improvements under H.B. 3095	<u>1,068</u>
Total FY 2022 SAF Appropriation	\$ 383,628

<sup>1</sup> School Aid Formula for TDC only is 74.01% of FY 2022 TDC pay for County employees plus FY 2022 TDC pay for State employees = 74.01% x \$118,551 + \$5,488 = \$93,228.

<sup>2</sup> County portion of the Old Group TRS payroll is 25.99% of FY 2022 TRS pay for County employees = 25.99% x \$82,566 = \$21,459.

<sup>3</sup> County portion of the New Group TRS payroll is 25.99% of FY 2022 TRS pay for County employees = 25.99% x \$1,552,477 = \$403,489.

<sup>4</sup> Actual amount to be released from the TDC suspense account at 6/30/2020 per Code Section 18-7A-18a(b).

# 1. Summary of Valuation

**Table 3**  
**Projection of Unfunded Accrued Liability and Annual Contributions (000's omitted)**

FY Ending 6/30	Unfunded AAL BOY <sup>1</sup>	Employer Normal Cost (MOY) <sup>2</sup>			Projected Payroll			Total Type 1 Employer Contribution (MOY) <sup>3</sup>		Total Type 3 Employer Contribution (MOY)	
		Type 1	Type 3	Type 3	Type 1 TRS	Type 3 TRS	TRS+TDC	% of Payroll	Amount	% of Payroll	Amount
2021	\$ 3,034,035	\$ 4,695	\$ 67,497	\$ 1,735,464	\$ 107,536	\$ 1,499,032	\$ 1,735,464	20.16%	\$ 349,929	3.89%	\$ 67,497
2022	2,903,642	3,379	63,033	1,790,999	83,776	1,583,184	1,790,999	19.43%	348,023	3.52%	63,033
2023	2,764,080	2,732	66,165	1,848,311	67,740	1,661,855	1,848,311	18.79%	347,376	3.58%	66,165
2024	2,614,051	2,195	69,272	1,907,457	54,424	1,739,905	1,907,457	18.18%	346,839	3.63%	69,272
2025	2,452,770	1,742	72,391	1,968,495	43,182	1,818,230	1,968,495	17.60%	346,386	3.68%	72,391
2026	2,279,393	1,356	75,529	2,031,487	33,631	1,897,066	2,031,487	17.03%	346,000	3.72%	75,529
2027	2,093,012	1,045	78,690	2,096,495	25,910	1,976,437	2,096,495	16.49%	345,689	3.75%	78,690
2028	1,892,653	783	81,875	2,163,582	19,411	2,056,423	2,163,582	15.97%	345,427	3.78%	81,875
2029	1,677,267	583	85,095	2,232,817	14,451	2,137,330	2,232,817	15.46%	345,227	3.81%	85,095
2030	1,445,727	422	88,369	2,304,267	10,474	2,219,549	2,304,267	14.98%	345,066	3.84%	88,369
2031	1,196,822	303	91,707	2,378,004	7,499	2,303,391	2,378,004	14.51%	344,947	3.86%	91,707
2032	929,249	214	95,105	2,454,100	5,291	2,388,725	2,454,100	14.05%	344,858	3.88%	95,105
2033	641,608	144	98,585	2,532,631	3,583	2,476,154	2,532,631	13.61%	344,788	3.89%	98,585
2034	332,394	98	102,143	2,613,675	2,432	2,565,494	2,613,675	13.19%	344,742	3.91%	102,143

<sup>1</sup> Net of any separately funded liability for benefit increases.

<sup>2</sup> Net of member contributions.

<sup>3</sup> Net of any amortization amounts for separately funded benefit increases.

# 1. Summary of Valuation

Table 4

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

FY Ending 6/30	Unfunded AAL BOY <sup>1</sup>	Interest on Unfunded at 7.50%	MOY Contribution Toward Unfunded <sup>2</sup>	Unfunded Funding Progress <sup>3</sup>
2021	\$ 3,034,035	\$ 227,553	\$ 345,234	\$ 130,393
2022	2,903,642	217,773	344,644	139,562
2023	2,764,080	207,306	344,644	150,029
2024	2,614,051	196,054	344,644	161,281
2025	2,452,770	183,958	344,644	173,377
2026	2,279,393	170,954	344,644	186,381
2027	2,093,012	156,976	344,644	200,359
2028	1,892,653	141,949	344,644	215,386
2029	1,677,267	125,795	344,644	231,540
2030	1,445,727	108,430	344,644	248,905
2031	1,196,822	89,762	344,644	267,573
2032	929,249	69,694	344,644	287,641
2033	641,608	48,121	344,644	309,214
2034	332,394	24,930	344,644	332,405

<sup>1</sup> Net of any separately funded liability for benefit increases.

<sup>2</sup> Net of employer contribution toward normal cost and any separately funded benefit increases.

<sup>3</sup> Equals (MOY Contribution) x 1.03682 - (Interest on Unfunded)

# 1. Summary of Valuation

**Table 5**  
**Cash Flow Projection FY 2021 Through FY 2034 (000's omitted)**

<b>FY Ending</b>	<b>MV Assets</b>		<b>Expected</b>			<b>MV Assets</b>	
<b>6/30</b>	<b>Beg. of Year</b>	<b>Contributions</b>	<b>Benefits</b>	<b>Earnings</b>	<b>Net Income</b>	<b>End of Year</b>	
2021	\$ 7,844,328	\$ 514,888	\$ 903,596	\$ 574,012	\$ 185,304	\$ 8,029,632	
2022	8,029,632	498,609	894,638	587,640	191,611	8,221,243	
2023	8,221,243	493,640	904,632	601,460	190,468	8,411,711	
2024	8,411,711	489,416	912,712	615,292	191,996	8,603,707	
2025	8,603,707	485,698	919,257	629,313	195,754	8,799,461	
2026	8,799,461	481,235	923,737	643,666	201,164	9,000,625	
2027	9,000,625	477,884	927,927	658,475	208,432	9,209,057	
2028	9,209,057	474,422	930,401	673,889	217,910	9,426,967	
2029	9,426,967	470,817	932,478	690,023	228,362	9,655,329	
2030	9,655,329	467,095	933,988	706,958	240,065	9,895,394	
2031	9,895,394	463,217	936,420	724,730	251,527	10,146,921	
2032	10,146,921	459,288	939,003	743,355	263,640	10,410,561	
2033	10,410,561	455,268	941,373	762,893	276,788	10,687,349	
2034	10,687,349	451,174	942,837	783,447	291,784	10,979,133	

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 6a**  
**Valuation Assets as of June 30, 2020 (000's omitted)**

	June 30, 2020	June 30, 2019
<b>Assets</b>		
Cash with State Treasurer	\$ 1,690	\$ 10
Investments at Fair Value	7,820,075	7,836,784
Contributions Receivable	21,585	25,559
Participant Loans Receivable	1,234	1,494
Appropriation Receivable	-	35,000
<b>Total Assets</b>	<b>\$ 7,844,584</b>	<b>\$ 7,898,847</b>
<b>Liabilities</b>		
Accrued Expenses and Other Payables	256	108
<b>Market Value of Assets</b>	<b>\$ 7,844,328</b>	<b>\$ 7,898,739</b>
Adjustment for Deferred Gains / (Losses)	(272,004)	110,257
<b>Actuarial Value of Assets</b>	<b>\$ 8,116,332</b>	<b>\$ 7,788,482</b>

**Table 6b**  
**Four-Year Asset Smoothing as of June 30, 2020 (000's omitted)**

FY Ending 6/30	Gain/(Loss) on Actuarial Value of Assets	Percent Deferred	Gain/(Loss) Deferred as of June 30, 2020	Gain/(Loss) Recognized for FY ending June 30, 2020
2020	\$ (337,250)	75%	\$ (252,938)	\$ (84,313)
2019	(114,208)	50%	(57,104)	(28,552)
2018	152,152	25%	38,038	38,038
2017	479,349	0%	-	119,837
			<b>\$ (272,004)</b>	<b>\$ 45,010</b>

# 1. Summary of Valuation

**Table 7**

**Statement of Changes in Market Value of Assets for Year ended June 30, 2020 (000's omitted)**

Market Value of Assets - Beginning of Year	\$	7,898,739
Post Valuation Adjustment		-
Market Value of Assets - After Adjustment	\$	7,898,739
Additions:		
Contributions:		
Member	\$	96,511
Employer		129,576
School Aid Formula		296,682
Make Up Contributions		-
Special Appropriations		37,582
Voluntary Special Contribution Members		-
Special Contribution Required Employers		-
Contribution Delinquency Fees		-
§33-3-14(d) Fees		-
Subtotal	\$	560,351
Investment Income:		
Net Appreciation in Fair Value <sup>1</sup>		241,072
Investment income		519
Subtotal	\$	241,591
Other Income		3,371
Total	\$	805,313
Deductions and Transfers:		
Benefit Expense	\$	844,272
Refunds of Contributions		9,695
Administrative Expenses		5,525
TDC to TRS Accounts for Transfers		-
Transfers to/(from) other plans		232
Total	\$	859,724
Net Increase	\$	(54,411)
Market Value of Assets - End of Year	\$	7,844,328
Investment Return for Year:		
Valuation purposes (assumes mid-year transactions and offsets investment income by investment and administrative expenses)		3.04%
Per Investment Management Board (time-weighted, excluding administrative expense)		3.2%

<sup>1</sup> Net of Investment Expense

# 1. Summary of Valuation

**Table 8**  
**Reconciliation of Plan Participants**

	Active	Non-Vested Terms	Vested Terms	Service Retirees	Disabled Retirees	Beneficiaries	Total
Census as of July 1, 2019	34,108	5,188	2,983	31,716	2,149	2,787	78,931
New Entrants	2,268	127	-	-	-	218	2,613
Returned to Active Status	698	(436)	(262)	-	-	-	-
Terminated Non-Vested	(573)	573	-	-	-	-	-
Terminated Vested	(593)	-	593	-	-	-	-
Withdrew Contributions	(148)	(204)	(134)	-	-	-	(486)
Retired	(931)	-	(104)	1,035	-	-	-
Disabled	(26)	-	(25)	-	51	-	-
Deceased	(37)	(12)	(13)	(921)	(83)	(150)	(1,216)
Certain Period Expired	-	-	-	-	-	(6)	(6)
Adjustments	(13)	(44)	-	1	-	-	(56)
Census as of July 1, 2020	34,753	5,192	3,038	31,831	2,117	2,849	79,780



# 1. Summary of Valuation

**Table 9**  
**Summary of Membership**

	<b>July 1, 2020</b> <b>Valuation</b>	<b>July 1, 2019</b> <b>Valuation</b>
<b>Active Members:</b>		
Teachers	20,664	20,259
Non-Teachers (including State)	14,089	13,849
Total	<u>34,753</u>	<u>34,108</u>
<b>Inactive Members:</b>		
Service Retirees	31,831	31,716
Disabled Retirees	2,117	2,149
Beneficiaries	2,849	2,787
Vested Terminated	3,038	2,983
Non-Vested Terminated	5,192	5,188
Total	<u>45,027</u>	<u>44,823</u>
<b>Total Members</b>	79,780	78,931

# 1. Summary of Valuation

**Table 10(a)**  
**Distribution of the Number and Total Annual Compensation of Active Teachers as of July 1, 2020**

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	Total		
Under 25	Count / Total Comp 544 22,461,308											Count / Total Comp 544 22,461,308
25 - 29	1,654 72,442,413	557 26,340,330										2,211 98,782,743
30 - 34	774 35,029,501	1,603 78,863,142	366 19,358,478									2,743 133,251,121
35 - 39	617 28,391,118	956 48,932,772	1,415 76,789,899	208 12,160,990								3,196 166,274,779
40 - 44	569 26,874,063	740 38,656,201	885 49,257,194	745 44,123,252	107 6,669,740							3,046 165,580,450
45 - 49	428 20,426,406	552 28,733,109	617 34,042,226	505 30,473,152	492 31,093,405	60 3,914,800						2,654 148,683,098
50 - 54	333 16,613,898	389 20,740,418	492 27,617,865	356 21,273,843	397 25,314,988	328 21,849,450	183 12,243,570					2,478 145,654,032
55 - 59	188 9,642,452	260 14,434,281	339 19,117,600	295 17,863,364	253 16,026,302	200 13,524,636	453 31,583,540	154 11,311,710				2,142 133,503,885
60 - 64	98 5,215,727	146 7,977,284	184 10,746,586	173 10,513,619	136 8,650,164	84 5,588,551	119 8,323,534	142 10,208,249	72 5,237,177			1,154 72,460,891
65 - 69	31 1,718,053	63 3,602,759	47 2,738,386	57 3,490,610	36 2,224,800	35 2,321,182	38 2,832,610	23 1,836,440	63 5,032,741			393 25,797,581
70 & over	11 664,005	11 595,268	18 1,131,537	9 545,641	4 251,124	6 393,083	16 1,309,912	8 572,564	20 1,429,945			103 6,893,079
Total	5,247 239,478,944	5,277 268,875,564	4,363 240,799,771	2,348 140,444,471	1,425 90,230,523	713 47,591,702	809 56,293,166	327 23,928,963	155 11,699,863			20,664 1,119,342,967

# 1. Summary of Valuation

**Table 10(b)**  
**Distribution of the Number and Total Annual Compensation of Active Non-Teachers (including State Employees) as of July 1, 2020**

Attained Age	Years of Eligibility Service										40 & over Count / Total Comp	Total Count / Total Comp	
	0 - 4 Count / Total Comp	5 - 9 Count / Total Comp	10 - 14 Count / Total Comp	15 - 19 Count / Total Comp	20 - 24 Count / Total Comp	25 - 29 Count / Total Comp	30 - 34 Count / Total Comp	35 - 39 Count / Total Comp	40 & over Count / Total Comp	Total Count / Total Comp			
Under 25	140 3,768,748	3 98,560											143 3,867,308
25 - 29	345 9,594,821	85 2,966,350											430 12,561,171
30 - 34	423 11,513,548	192 7,211,162	49 2,432,546										664 21,157,256
35 - 39	538 14,870,143	301 9,991,325	174 8,894,051	33 1,823,415									1,046 35,578,934
40 - 44	643 17,289,414	464 14,855,379	312 12,077,302	156 9,097,172	32 1,814,034	1 51,519							1,608 55,184,820
45 - 49	626 16,995,992	608 19,151,826	452 15,981,028	244 10,369,168	110 6,179,707	23 1,411,541	2 87,619						2,065 70,176,881
50 - 54	546 14,854,279	587 18,032,546	570 19,592,406	340 12,729,835	214 9,944,995	92 5,228,467	74 4,200,129	5 291,798					2,428 84,874,455
55 - 59	451 12,470,290	554 16,557,837	615 20,035,980	443 15,821,551	352 13,958,217	133 6,374,092	136 8,624,772	91 5,881,792	7 361,102				2,782 100,085,633
60 - 64	283 7,431,475	404 11,774,833	372 11,963,813	317 3,413,897	283 3,131,432	126 1,977,151	98 1,540,495	72 4,808,494	49 3,309,120				2,004 71,786,911
65 - 69	88 2,278,033	137 3,749,856	112 3,663,584	96 3,413,897	79 3,131,432	46 1,977,151	34 1,540,495	19 1,059,522	25 1,472,219				636 22,286,189
70 & over	40 902,440	56 1,563,217	55 1,672,701	41 1,327,798	26 906,220	13 627,607	22 976,675	10 441,498	20 1,247,339				283 9,665,495
Total	4,123 111,969,183	3,391 105,952,891	2,711 96,313,411	1,670 65,433,246	1,096 46,895,781	434 21,281,001	366 20,506,656	197 12,483,104	101 6,389,780				14,089 487,225,053

# 1. Summary of Valuation

**Table 11**  
**Distribution of the Number and Average Monthly Benefits of Retired Participants as of July 1, 2020**

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	-	-	-	-	-	-	14	27	1,230	14	27	1,230
35 - 39	-	-	-	3	39	782	10	37	1,153	13	37	1,068
40 - 44	-	-	-	10	43	741	19	43	1,246	29	43	1,072
45 - 49	-	-	-	25	48	717	32	47	762	57	47	742
50 - 54	15	54	2,253	71	53	962	60	52	756	146	53	1,010
55 - 59	805	58	3,109	220	57	1,098	120	57	1,014	1,145	58	2,503
60 - 64	4,004	62	2,600	387	62	1,018	197	62	1,244	4,588	62	2,408
65 - 69	8,298	67	2,437	495	67	1,042	393	67	1,295	9,186	67	2,313
70 - 74	7,913	72	2,181	463	72	965	496	72	1,266	8,872	72	2,067
75 - 79	4,615	77	1,772	294	77	810	478	77	1,119	5,387	77	1,661
80 - 84	3,014	82	1,398	113	81	594	404	82	927	3,531	82	1,319
85 - 89	1,943	87	1,162	24	86	470	333	87	897	2,300	87	1,116
90 - 94	935	92	997	8	92	511	225	92	789	1,168	92	954
95 & over	289	97	879	4	96	355	68	97	619	361	97	824
<b>Total</b>	<b>31,831</b>	<b>72</b>	<b>2,082</b>	<b>2,117</b>	<b>68</b>	<b>952</b>	<b>2,849</b>	<b>75</b>	<b>1,072</b>	<b>36,797</b>	<b>72</b>	<b>1,939</b>
<b>Total Annual Benefits</b>			<b>795,142,377</b>			<b>24,192,866</b>			<b>36,639,002</b>			<b>855,974,245</b>

# 1. Summary of Valuation

**Table 12**  
**Distribution of the Number and Average Monthly Benefits**  
**of Participants Entitled to Deferred Benefits as of July 1, 2020**

Current Age	Count	Deferred Vested	
		Avg. Age	Avg. Mo. Benefit
under 35	332	32	437
35 - 39	441	37	542
40 - 44	363	42	622
45 - 49	396	47	679
50 - 54	451	52	698
55 - 59	586	57	734
60 - 64	360	61	667
65 - 69	93	66	613
70 - 74	12	71	1,768
75 - 79	3	76	2,154
80 & over	1	81	800
Total	3,038	48	642
Total Annual Benefits			23,393,596

## 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.

### 3. Actuarial Assumptions and Methods

#### Valuation Date

July 1, 2020

#### 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 on the basis of 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. These assumptions will remain in effect for valuation purposes until the Board adopts revised assumptions.

#### Interest Rate and Expenses

The valuation interest assumption is 7.5% 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 3.00%. The ranges of projected salary increases are as follows:

- Teachers 3.00% to 6.16% per year
- Non-Teachers 3.00% to 6.76% 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 <sup>1</sup> 101% of Pub-2010 Contingent Survivor male table, headcount-weighted, projected generationally with scale MP-2019
- Beneficiary females <sup>1</sup> 113% of Pub-2010 Contingent Survivor female table, headcount-weighted, projected generationally with scale MP-2019

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<sup>1</sup> 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.

## Appendix – Detailed Assumptions

### Salary Scales

Age	Teachers	Non-Teachers and State	Age	Teachers	Non-Teachers and State
19	6.155%	6.760%	45	4.441%	4.731%
20	6.155	6.760	46	4.355	4.657
21	6.155	6.760	47	4.269	4.583
22	6.155	6.633	48	4.184	4.511
23	6.155	6.507	49	4.098	4.437
24	6.155	6.383	50	4.012	4.363
25	6.155	6.258	51	3.926	4.290
26	6.068	6.158	52	3.841	4.215
27	5.984	6.057	53	3.755	4.141
28	5.897	5.984	54	3.720	4.068
29	5.812	5.911	55	3.684	3.995
30	5.725	5.837	56	3.649	3.921
31	5.641	5.763	57	3.603	3.847
32	5.554	5.689	58	3.556	3.774
33	5.469	5.615	59	3.510	3.699
34	5.383	5.541	60	3.464	3.625
35	5.298	5.469	61	3.417	3.552
36	5.211	5.395	62	3.371	3.479
37	5.126	5.321	63	3.325	3.405
38	5.040	5.246	64	3.278	3.332
39	4.955	5.173	65	3.232	3.258
40	4.868	5.099	66	3.185	3.206
41	4.784	5.026	67	3.139	3.155
42	4.697	4.953	68	3.093	3.103
43	4.612	4.879	69	3.046	3.052
44	4.525	4.805	70	3.000	3.000

## 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