

West Virginia Public Employees' Retirement System

Actuarial Valuation as of July 1, 2021

March 2022



110 W. Berry Street
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Fort Wayne, IN 46802

March 31, 2022

West Virginia Consolidated Public Retirement Board
West Virginia Public Employees' 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 Public Employees' Retirement System (PERS) as of July 1, 2021. This valuation presents the annual cost and related liabilities of the System as of the valuation date.

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.

The valuation results indicate that the expected state contributions of 10.0% of payroll plus member contributions of 4.5% of payroll for Tier 1 active participants and 6.0% of payroll for Tier 2 active participants are sufficient to meet the annual funding requirement of the System.

This report presents fairly the actuarial position of the West Virginia Public Employees' Retirement System 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 PERS experience and represent our best estimate of anticipated future experience of PERS. 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 actuarial 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.

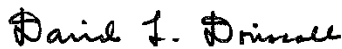
Where presented, the “funded ratio” and “unfunded accrued liability” are typically measured using the actuarial value of assets. Use of the market value of assets instead would result in different funded ratios and unfunded accrued liabilities. Moreover, the funded ratio presented is appropriate for 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 in assessing the funding requirements of the system. Measurements made for financial reporting purposes under GASB Statements Nos. 67 and 68 are reported separately. Use of this report 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 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.

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

Buck Global, LLC



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1. Summary of Valuation

This report presents the results of the July 1, 2021, actuarial valuation of the West Virginia Public Employees' Retirement System (PERS). The development of the results, including for comparison purposes the corresponding results as of July 1, 2020, is presented in Table 1. 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 Public Employees' Retirement System is a defined benefit plan providing unreduced monthly benefits to Tier 1 members upon retirement at age 60 after completing 5 years of service, or retirement on or after age 55 and meeting the "Rule of 80." 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 employer contributions, currently at 10.0% of payroll, and member contributions of 4.5% of payroll for Tier 1 and 6.0% of payroll for Tier 2. The major purpose of the valuation is to determine the adequacy of the expected contributions with respect to funding expected System liabilities.

The valuation indicates that current contribution levels are more than the calculated cost to fund the benefits accruing during the year (the normal cost) plus the amount required to amortize at a level dollar amount the System's primary unfunded liability originally established as of July 1, 2005 over a 14-year period (30 years from July 1, 2005) and the amount required to amortize the liability for benefit improvements to annuitants under HB 3095 over a 4-year period (6 years from July 1, 2019).

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. The calculated Employer cost is determined as the Employer's share of the normal cost (the cost to fund benefits accruing during the year), plus amortization of the unfunded liability segments over the specified periods.

Table 2a presents the development of the actuarial gain/(loss) as of July 1, 2021. Table 2b presents a reconciliation of the unfunded liability compared to the prior year. Table 2c 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 \$232.1 million.

The actual unfunded liability of \$196.4 million differed from the expected amount of \$541.7 million due to the following reasons:

- The demographic and salary experience resulted in a net liability loss of \$9.0 million, which is 0.11% of the expected liability.
- The return on the actuarial value of assets for the year ending June 30, 2021, was approximately 12.57%, which was significantly higher than the assumed return of 7.50%. This favorable investment experience resulted in an asset gain of \$354.3 million.

1. Summary of Valuation

Table 3a presents a projection of the primary unfunded liability to June 30, 2035. The primary unfunded liability at the valuation date is \$194.6 million. This table shows the expected pattern of change in the primary unfunded liability over the remaining 14-year period. Table 3b presents a projection of the unfunded liability for benefit improvements to annuitants attributable to HB 3095 through June 30, 2025. This unfunded liability at the valuation date is \$1.8 million. This table shows the expected pattern of change in this unfunded liability over the remaining 4-year period.

Table 4 presents a cash flow projection of expected asset balances, contributions, benefit payments, and earnings on a closed-group basis through the fiscal year ending June 30, 2046. 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, future expected plan contributions are expected to decline 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%.

Funding Progress

Table 5a presents the market value and actuarial value of assets for the fiscal year ending June 30, 2021 and, for comparison purposes, the fiscal year ending June 30, 2020. Table 5b presents the 4-year smoothing of deferred gains and losses used in the calculation of the actuarial value of assets. Table 6 presents the change in market value of assets for the fiscal year ending June 30, 2021.

System Membership

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

Group	July 1, 2021	July 1, 2020
Actives	35,576	35,781
Retirees and Beneficiaries	29,009	28,450
Terminated Vested	4,929	4,918
Terminated Non-Vested	<u>22,448</u>	<u>21,013</u>
Total	91,962	90,162

Table 7 presents a reconciliation of system membership over the year and Table 8 presents supplemental information on system membership.

Tables 9a and 9b show the number and total compensation for State and Nonstate active members by 5-year age and eligibility service groupings as of July 1, 2021.

Table 10 shows the number and average monthly benefits of retirees and beneficiaries included in the valuation distributed by fifth age group. Table 11 shows a similar distribution for terminated members entitled to deferred benefits.

1. Summary of Valuation

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

	July 1, 2021	July 1, 2020
Membership:		
• Active	35,576	35,781
• Inactive	56,386	54,381
• Total	<u>91,962</u>	<u>90,162</u>
1. Present Value of Future Benefits		
a. Active	\$ 4,356,413	\$ 4,045,440
b. Inactive:		
• Retirees	3,796,057	3,588,457
• Disabled Retirees	207,456	211,387
• Beneficiaries	358,598	329,058
• Vested Terminated	245,525	230,695
• Non-Vested Terminated	24,611	21,538
c. Total	<u>\$ 8,988,660</u>	<u>\$ 8,426,575</u>
2. Actuarial Accrued Liability	\$ 7,942,242	\$ 7,506,535
3. Assets at Actuarial Value	\$ 7,745,853	\$ 7,129,022
4. Unfunded Actuarial Accrued Liability (2) - (3)	\$ 196,389	\$ 377,513
a. Primary Unfunded	\$ 194,605	\$ 375,358
b. Improvements for annuitants per HB 3095	\$ 1,784	\$ 2,155
5. Annual Normal Cost Rate (Tier 1)		
a. Present Value of Future Normal Cost	\$ 703,789	\$ 663,957
b. Present Value of Future Payroll	\$ 7,196,083	\$ 7,347,089
c. Normal Cost Rate as a % of Payroll (5a) / (5b)	9.78%	9.04%
d. Employee Contribution Rate	4.50%	4.50%
e. Employer Share of Normal Cost	5.28%	4.54%
f. Valuation Compensation FY 2022 (2021)	\$ 1,109,449	\$ 1,151,924
6. Annual Normal Cost Rate (Tier 2)		
a. Present Value of Future Normal Cost	\$ 342,629	\$ 256,083
b. Present Value of Future Payroll	\$ 3,817,084	\$ 3,038,539
c. Normal Cost Rate as a % of Payroll (6a) / (6b)	8.98%	8.43%
d. Employee Contribution Rate	6.00%	6.00%
e. Employer Share of Normal Cost	2.98%	2.43%
f. Valuation Compensation FY 2022 (2021)	\$ 501,949	\$ 425,366
7. Calculated Employer Cost FY 2022 (2021)		
a. Amortization Payment on UAAL MOY ¹	\$ 21,810	\$ 41,013
b. Amortization Payment on HB 3095 MOY ²	511	514
c. Employer Normal Cost MOY	76,156	64,940
d. Total Employer Cost MOY	<u>\$ 98,477</u>	<u>\$ 106,467</u>
e. Employer Cost as Percentage of Compensation	6.11%	6.75%
8. Expected Employer Contributions FY 2022 (2021)		
a. Employer Contribution Rate	10.00%	10.00%
b. Employer Contribution	\$ 161,140	\$ 157,729

¹ FY 2022 amortization payment is over 14 years (30 years from July 1, 2005).

² FY 2022 amortization payment is over 4 years (6 years from July 1, 2019).

1. Summary of Valuation

Table 2a
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	\$ 7,506,535
b. Normal Cost	139,992
c. Interest on (a) and (b) at 7.50%	573,489
d. Benefit Payments and Transfers	(500,526)
e. Interest on (d) at 7.50%, Adjusted for Timing	(18,430)
f. Assumption Changes	232,148
g. Plan Changes	0
h. Expected Actuarial Accrued Liability as of July 1, 2021	<u>\$ 7,933,208</u>
2. Actual Actuarial Accrued Liability as of July 1, 2021	\$ 7,942,242
3. Liability Gain/(Loss): (1h) - (2)	\$ (9,034)
4. Expected Actuarial Asset Value	
a. Actuarial Value of Assets as of July 1, 2020	\$ 7,129,022
b. Interest on (a) at 7.50%	534,677
c. Member Contributions	78,762
d. Employer Contributions	159,259
e. Interest on (c) and (d) at 7.50%, Adjusted for Timing	8,764
f. Benefit Payments and Transfers	(500,526)
g. Interest on (f) at 7.50%, Adjusted for Timing	(18,430)
h. Expected Actuarial Asset Value as of July 1, 2021	<u>\$ 7,391,528</u>
5. Actual Actuarial Asset Value as of July 1, 2021	\$ 7,745,853
6. Actuarial Asset Value Gain/(Loss): (5) - (4h)	\$ 354,325
7. Total Actuarial Gain/(Loss): (3) + (6)	\$ 345,291

1. Summary of Valuation

Table 2b

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

	Amount
1. Unfunded Liability as of July 1, 2020	\$ 377,513
a. Interest on Unfunded Liability at 7.50%	\$ 28,313
b. Normal Cost	139,992
c. Member Contributions	(78,762)
d. Employer Contributions	(159,259)
e. Interest on (b) through (d) at 7.50%, Adjusted for Timing	1,735
f. Assumption Changes	232,148
g. Plan Changes	0
h. Expected Change in Unfunded Liability during FY 2021	<u>\$ 164,167</u>
2. Expected Unfunded Liability as of July 1, 2021: (1) + (1h)	\$ 541,680
a. Liability (Gain)/Loss during FY 2021	\$ 9,034
b. Actuarial Assets (Gain)/Loss during FY 2021	<u>(354,325)</u>
c. Total Actuarial (Gain)/Loss during FY 2021	\$ (345,291)
3. Actual Unfunded Liability as of July 1, 2021: (2) + (2c)	\$ 196,389

1. Summary of Valuation

Table 2c

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

	Gain/(Loss)
1. Demographic and Salary Experience	
a. Retirement Experience	\$ (4,911)
b. Termination Experience	2,016
c. Disability Experience	(1,292)
d. Active Mortality Experience	10,925
e. Inactive Mortality Experience	(8,108)
f. Salary Increases	6,876
g. New Entrants and Rehires	(15,028)
h. Benefit Payments Different Than Expected	(6,774)
i. Miscellaneous ¹	7,262
j. Total	<u>\$ (9,034)</u>
2. Assumption Changes	\$ (232,148)
3. Plan Changes	\$ 0
4. Total	\$ (241,182)

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 3a
Projection of Unfunded Liability and Annual Payments (000's omitted)
Primary Unfunded Liability Established July 1, 2005

Fiscal Year Ending 6/30	Unfunded Liability at Beg. of Year	Projected Total Payroll	Amortization Payments	
			% of Payroll	Amount
2022	\$ 194,605	\$ 1,611,398	1.35%	\$ 21,810
2023	186,127	1,679,882	1.30%	21,810
2024	177,035	1,751,277	1.25%	21,810
2025	167,283	1,825,707	1.19%	21,810
2026	156,824	1,903,299	1.15%	21,810
2027	145,607	1,984,189	1.10%	21,810
2028	133,577	2,068,518	1.05%	21,810
2029	120,674	2,156,430	1.01%	21,810
2030	106,836	2,248,078	0.97%	21,810
2031	91,995	2,343,621	0.93%	21,810
2032	76,078	2,443,225	0.89%	21,810
2033	59,007	2,547,062	0.86%	21,810
2034	40,698	2,655,312	0.82%	21,810
2035	21,062	2,768,163	0.79%	21,810

Table 3b
Projection of Unfunded Liability and Annual Payments (000's omitted)
Liability for Improvements for Annuitants per HB 3095 Established July 1, 2019

Fiscal Year Ending 6/30	Unfunded Liability at Beg. of Year	Projected Total Payroll	Amortization Payments	
			% of Payroll	Amount
2022	\$ 1,784	\$ 1,611,398	0.03%	\$ 511
2023	1,384	1,679,882	0.03%	511
2024	955	1,751,277	0.03%	511
2025	495	1,825,707	0.03%	511

1. Summary of Valuation

Table 4
Cash Flow Projection FY 2022 through FY 2046 (000's omitted)

FY Ending 6/30	Assets Beg. of Year	Expected Contributions	Benefits	Earnings	Net Income	Assets End of Year
2022	\$ 8,805,884	\$ 241,182	\$ 540,397	\$ 627,770	\$ 328,555	\$ 9,134,439
2023	9,134,439	204,735	535,042	650,483	320,176	9,454,615
2024	9,454,615	191,423	552,842	672,587	311,168	9,765,783
2025	9,765,783	180,332	571,768	694,078	302,642	10,068,425
2026	10,068,425	170,555	590,472	715,005	295,088	10,363,513
2027	10,363,513	161,308	609,039	735,408	287,677	10,651,190
2028	10,651,190	152,097	627,177	755,291	280,211	10,931,401
2029	10,931,401	142,805	644,241	774,668	273,232	11,204,633
2030	11,204,633	133,597	660,731	793,562	266,428	11,471,061
2031	11,471,061	124,461	676,759	811,981	259,683	11,730,744
2032	11,730,744	115,800	692,738	829,931	252,993	11,983,737
2033	11,983,737	107,443	707,508	847,449	247,384	12,231,121
2034	12,231,121	99,643	721,416	864,611	242,838	12,473,959
2035	12,473,959	92,133	733,761	881,510	239,882	12,713,841
2036	12,713,841	85,004	744,321	898,271	238,954	12,952,795
2037	12,952,795	78,232	753,156	915,040	240,116	13,192,911
2038	13,192,911	71,808	760,535	931,957	243,230	13,436,141
2039	13,436,141	65,729	766,060	949,177	248,846	13,684,987
2040	13,684,987	60,036	769,771	966,884	257,149	13,942,136
2041	13,942,136	54,617	772,040	985,253	267,830	14,209,966
2042	14,209,966	49,548	771,877	1,004,496	282,167	14,492,133
2043	14,492,133	44,885	769,636	1,024,867	300,116	14,792,249
2044	14,792,249	40,565	765,312	1,046,626	321,879	15,114,128
2045	15,114,128	36,674	759,177	1,070,042	347,539	15,461,667
2046	15,461,667	33,083	751,014	1,095,401	377,470	15,839,137

Notes:

1. Earnings are based on an assumed asset return of 7.25%.
2. The fund balance as of July 1, 2021 is the market value of the fund.
3. Contributions are based on a Tier 1 member contribution rate of 4.5%, a Tier 2 member contribution rate of 6.0%, and a State contribution rate of 9.0% times the projected payroll on a closed-group basis. The State contribution rate is 10.0% for FY 2022.
4. The projection of future benefit payments is based on all members included in the valuation, including active and terminated vested members who are not yet receiving benefits.
5. No new entrants are assumed in this projection.

1. Summary of Valuation

Table 5a
Actuarial Value of Assets as of June 30, 2021 (000's omitted)

	June 30, 2021	June 30, 2020
Assets		
• Cash with State Treasurer	\$ 744	\$ 451
• Investments at Fair Value	8,807,095	6,899,129
• Contributions Receivable	4,193	4,674
• Other Receivables	33	5,034
• Total Assets	<u>\$ 8,812,065</u>	<u>\$ 6,909,288</u>
Liabilities		
• Accrued Expenses and Other Payables	<u>6,181</u>	<u>6,035</u>
Market Value of Assets	\$ 8,805,884	\$ 6,903,253
Adjustments for Actuarial Value of Assets		
• Smoothing of Deferred Gains / (Losses)	\$ 1,060,031	\$ (230,769)
• DHSS Settlement Accrual	-	5,000
• Total Adjustments	<u>\$ 1,060,031</u>	<u>\$ (225,769)</u>
Actuarial Value of Assets	\$ 7,745,853	\$ 7,129,022

Table 5b
Four-Year Asset Smoothing as of June 30, 2021 (000's omitted)

Fiscal Year Ending 6/30	Total Asset Gain / (Loss) for Fiscal Year	Percent Deferred	Gain / (Loss) Deferred for Fiscal Year	Gain / (Loss) First Recognized for Fiscal Year
2021	\$ 1,638,971	75%	\$ 1,229,228	\$ 409,743
2020	(291,701)	50%	(145,851)	(72,925)
2019	(93,383)	25%	(23,346)	(23,346)
2018	138,794	0%	0	34,699
Total			<u>\$ 1,060,031</u>	<u>\$ 348,171</u>

1. Summary of Valuation

Table 6

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

	Amount
Market Value of Assets - Beginning of Year	\$ 6,903,253
Prior Period Adjustment	-
Market Value of Assets - Beginning of Year Restated	<u>\$ 6,903,253</u>
Additions:	
• Contributions:	
○ Member - Tier 1	50,242
○ Member - Tier 2	28,520
○ Employer - Tier 1	111,726
○ Employer - Tier 2	47,533
○ Reinstatements	-
○ Special Appropriation	-
○ Subtotal	<u>\$ 238,021</u>
• Investment Income:	
○ Net Appreciation ¹ and Interest	2,170,293
○ Other Return in Investments	-
○ Subtotal	<u>\$ 2,170,293</u>
• Other Income	<u>1,154</u>
• Total	<u>\$ 2,409,468</u>
Deductions and Transfers:	
• Benefit Expense	469,160
• Refunds of Contributions	9,934
• Administrative Expenses	6,311
• Transfers to / (from) Other Systems	21,432
• Total	<u>\$ 506,837</u>
Net Increase	1,902,631
Market Value of Assets - End of Year	\$ 8,805,884
Investment Return for Year on Market Value:	
• Valuation Purposes (assumes mid-year transactions and offsets investment income by investment and administrative expense)	31.95%
• Per Investment Management Board (time-weighted, excluding administrative expense)	32.10%

¹ Net of investment expense

1. Summary of Valuation

Table 7
Reconciliation of System Members

	Active	Non-Vested Terms	Vested Terms	Service Retirees	Disabled Retirees	Beneficiaries	Total
Census as of July 1, 2020	35,781	21,013	4,918	22,022	2,173	4,255	90,162
• New Entrants	3,369	677	-	-	-	-	4,046
• Returned to Active Status	617	(379)	(227)	(11)	-	-	-
• Terminated Non-Vested	(1,605)	1,606	(1)	-	-	-	-
• Terminated Vested	(563)	(7)	570	-	-	-	-
• Withdrew Contributions	(609)	(356)	(110)	-	-	-	(1,075)
• Transferred out	(115)	(1)	-	-	-	-	(116)
• Retired	(1,175)	(6)	(171)	1,352	-	-	-
• Disabled	(24)	(1)	(12)	-	37	-	-
• Deceased	(94)	(90)	(37)	(885)	(116)	(261)	(1,483)
• New Beneficiaries	-	-	-	-	-	430	430
• New QDRO's	-	-	-	-	-	20	20
• Adjustments	(6)	(8)	(1)	-	-	(7)	(22)
Census as of July 1, 2021	35,576	22,448	4,929	22,478	2,094	4,437	91,962

1. Summary of Valuation

Table 8
Summary of Membership and Payroll

	July 1, 2021	July 1, 2020
Active Members		
• State Employees	22,875	23,333
• Nonstate Employees	12,701	12,448
• Total	<u>35,576</u>	<u>35,781</u>
• Tier 1 Employees	22,268	23,893
• Tier 2 Employees	13,308	11,888
• Total	<u>35,576</u>	<u>35,781</u>
• Average Age	46.91	46.93
• Average Service	10.62	10.60
Inactive Members		
• Service Retirees	22,478	22,022
• Disabled Retirees	2,094	2,173
• Beneficiaries	4,437	4,255
• Vested Terminated	4,929	4,918
• Non-Vested Terminated	22,448	21,013
• Total	<u>56,386</u>	<u>54,381</u>
Payroll for Normal Cost		
• State Employees	\$ 1,072,666,000	\$ 1,068,522,000
• Nonstate Employees	538,732,000	508,768,000
• Total	<u>\$ 1,611,398,000</u>	<u>\$ 1,577,290,000</u>
• Tier 1 Employees	\$ 1,109,449,000	\$ 1,151,924,000
• Tier 2 Employees	501,949,000	425,366,000
• Total	<u>\$ 1,611,398,000</u>	<u>\$ 1,577,290,000</u>
PV of Future Payroll	\$ 11,013,167,000	\$ 10,385,628,000
PV of Member Contributions	\$ 552,849,000	\$ 512,931,000

1. Summary of Valuation

Table 9a
Distribution of Active Members as of July 1, 2021 - State

Attained Age	Years of Eligibility Service									Total
	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 & up	
	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	949	8	-	-	-	-	-	-	-	957
	33,649,430	356,438	-	-	-	-	-	-	-	34,005,868
25 - 29	1,327	284	5	-	-	-	-	-	-	1,616
	51,092,174	13,059,786	307,706	-	-	-	-	-	-	64,459,666
30 - 34	1,047	711	158	3	-	-	-	-	-	1,919
	40,870,364	33,521,319	7,928,798	180,883	-	-	-	-	-	82,501,364
35 - 39	897	643	521	109	3	-	-	-	-	2,173
	33,821,177	30,140,519	26,455,613	6,016,830	175,015	-	-	-	-	96,609,154
40 - 44	940	651	535	439	133	4	-	-	-	2,702
	35,886,466	30,210,494	26,945,288	24,326,232	7,363,920	194,006	-	-	-	124,926,406
45 - 49	906	661	510	448	533	144	1	-	-	3,203
	35,997,549	30,290,772	25,601,687	24,106,629	31,531,846	9,059,675	67,045	-	-	156,655,203
50 - 54	853	701	544	464	498	456	141	6	-	3,663
	33,525,002	31,610,264	27,028,623	23,865,130	27,871,320	28,773,247	8,866,933	386,613	-	181,927,132
55 - 59	712	587	532	455	372	277	222	62	6	3,225
	28,691,284	26,762,008	25,299,285	23,043,724	20,287,538	17,150,345	14,071,538	3,535,894	363,095	159,204,711
60 - 64	383	410	390	347	267	165	117	100	49	2,228
	15,860,199	18,109,210	18,326,500	17,768,936	13,888,708	10,068,292	7,428,059	6,356,675	2,728,330	110,534,909
65 - 69	120	139	159	126	74	70	51	42	55	836
	5,644,906	6,532,018	8,037,908	6,225,722	3,897,251	4,149,855	3,095,289	2,645,677	3,261,911	43,490,537
70 & up	61	55	66	49	41	20	20	11	30	353
	2,980,056	2,622,773	3,244,387	2,378,560	2,055,998	1,254,668	1,288,738	616,108	1,909,502	18,350,790
Total	8,195	4,850	3,420	2,440	1,921	1,136	552	221	140	22,875
	318,018,607	223,215,601	169,175,795	127,912,646	107,071,596	70,650,088	34,817,602	13,540,967	8,262,838	1,072,665,740

1. Summary of Valuation

Table 9b
Distribution of Active Members as of July 1, 2021 - Nonstate

Attained Age	Years of Eligibility Service									Total
	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 & up	
	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	742	10	-	-	-	-	-	-	-	752
	22,801,161	317,977	-	-	-	-	-	-	-	23,119,138
25 - 29	724	213	7	-	-	-	-	-	-	944
	24,602,743	8,952,186	317,257	-	-	-	-	-	-	33,872,186
30 - 34	685	344	90	5	-	-	-	-	-	1,124
	25,145,146	15,278,927	4,160,449	259,261	-	-	-	-	-	44,843,783
35 - 39	603	299	228	70	1	-	-	-	-	1,201
	22,085,961	13,867,328	11,238,902	3,615,403	55,016	-	-	-	-	50,862,610
40 - 44	577	309	268	207	62	2	-	-	-	1,425
	20,624,633	13,355,040	13,283,376	11,050,220	3,379,444	101,209	-	-	-	61,793,922
45 - 49	574	348	214	195	173	71	4	-	-	1,579
	20,136,541	14,775,688	10,008,020	9,876,394	9,690,383	4,080,418	242,584	-	-	68,810,028
50 - 54	541	370	257	227	208	162	70	6	-	1,841
	20,063,396	16,046,230	11,832,911	10,990,656	11,212,060	9,438,106	4,230,519	316,870	-	84,130,748
55 - 59	444	328	307	238	186	104	106	51	4	1,768
	16,683,463	13,266,473	13,108,437	11,261,332	9,442,041	5,544,826	5,849,669	3,170,943	257,297	78,584,481
60 - 64	274	267	224	177	152	99	65	30	33	1,321
	10,617,455	10,668,726	10,302,094	8,492,894	7,239,826	5,333,543	3,844,328	1,707,220	2,009,454	60,215,540
65 - 69	106	90	88	60	49	31	31	13	20	488
	3,910,505	3,824,697	3,543,985	2,889,560	2,328,599	1,309,734	1,848,499	679,406	1,206,481	21,541,466
70 & up	47	36	44	35	27	29	20	7	13	258
	1,962,376	1,320,343	1,560,271	1,401,390	1,306,518	1,191,354	997,727	387,204	830,536	10,957,719
Total	5,317	2,614	1,727	1,214	858	498	296	107	70	12,701
	188,633,380	111,673,615	79,355,702	59,837,110	44,653,887	26,999,190	17,013,326	6,261,643	4,303,768	538,731,621

1. Summary of Valuation

Table 10
Distribution of Retired Members as of July 1, 2021

Current Age	Service Retirees			Disabled Retirees		
	Count	Avg. Age	Avg. Mo. Benefit	Count	Avg. Age	Avg. Mo. Benefit
Under 30	-	-	-	-	-	-
30 - 34	-	-	-	-	-	-
35 - 39	-	-	-	1	38	2,006
40 - 44	-	-	-	15	43	1,211
45 - 49	-	-	-	50	48	1,400
50 - 54	-	-	-	139	52	1,404
55 - 59	764	58	2,373	256	57	1,400
60 - 64	3,087	62	1,862	429	62	1,335
65 - 69	5,662	67	1,623	452	67	828
70 - 74	5,840	72	1,502	421	72	778
75 - 79	3,286	77	1,356	200	77	678
80 - 84	2,089	82	1,120	85	82	492
85 - 89	1,142	87	929	31	87	400
90 - 94	469	92	817	10	92	426
95 & over	139	97	661	5	95	507
Total	22,478	72	1,506	2,094	66	1,010
Total Annual Benefits			406,268,976	25,376,856		

Current Age	Beneficiaries			Total Pensioners		
	Count	Avg. Age	Avg. Mo. Benefit	Count	Avg. Age	Avg. Mo. Benefit
Under 30	5	27	1,230	5	27	1,230
30 - 34	11	31	1,188	11	31	1,188
35 - 39	20	37	715	21	37	776
40 - 44	32	42	872	47	42	980
45 - 49	56	47	988	106	47	1,182
50 - 54	79	52	1,004	218	52	1,259
55 - 59	227	57	952	1,247	58	1,915
60 - 64	393	62	1,036	3,909	62	1,721
65 - 69	601	67	946	6,715	67	1,509
70 - 74	737	72	955	6,998	72	1,401
75 - 79	763	77	890	4,249	77	1,240
80 - 84	618	82	760	2,792	82	1,021
85 - 89	505	87	702	1,678	87	851
90 - 94	284	92	604	763	92	733
95 & over	106	97	531	250	97	603
Total	4,437	74	862	29,009	72	1,372
Total Annual Benefits			45,875,112	477,520,944		

1. Summary of Valuation

Table 11
Distribution of Members Entitled to Deferred Benefits as of July 1, 2021

Current Age	Deferred Vested		
	Count	Avg. Age	Avg. Mo. Benefit
Under 30	49	28	373
30 - 34	270	32	428
35 - 39	499	37	547
40 - 44	626	42	624
45 - 49	794	47	792
50 - 54	996	52	844
55 - 59	929	57	736
60 - 64	578	62	598
65 - 69	168	67	505
70 - 74	17	71	733
75 - 79	1	75	496
80 - 84	2	81	148
85 - 89	-	-	-
90 - 94	-	-	-
95 & over	-	-	-
Total	4,929	50	689
Total Annual Benefits		40,731,492	

2. Summary of System Provisions

System Name

The West Virginia Public Employees' Retirement System

Effective Date

The West Virginia Public Employees' Retirement Act was originally enacted March 11, 1961 to be effective July 1, 1961.

System Membership

All employees of the State of West Virginia or of any participating political subdivisions are required (with certain exceptions) to become system members. Among those employees not eligible for system membership are members (and retirees) of other State retirement systems, except for retirees from the Department of Public Safety or from municipal police or fire departments. Members of the State legislature and of local legislative bodies may elect system membership regardless of the above exclusions.

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

Annual Compensation

Annual compensation is the total salary paid to a member by a participating employer, including overtime pay. Non-cash payments are included for members first hired before July 1, 2014.

Final Average Salary

Final average salary is the average of a member's annual compensation during the 3 consecutive years (5 years for Tier 2) of credited service during the 15 years preceding the termination of employment that produces the highest such average. If the member has less than 5 years of credited service, the final average salary is the average annual compensation during the period of credited service. Special rules apply to members of the legislature.

Contributions

Member Contributions

Tier 1 members contribute 4.5% of their salary to the system. Tier 2 members contribute 6.0% of their salary to the system. Member contributions earn interest at a rate of 4.0%, compounded annually (3.0% prior to July 1, 1968).

Employer Contributions

The State and its participating political subdivisions contribute 9.0% of members' compensation to the retirement system effective July 1, 2022. Historical employer contribution rates are as follows:

- | | | | |
|---------------------------------|-------|---------------------------------|-------|
| • July 1, 2018 to June 30, 2022 | 10.0% | • July 1, 2012 to June 30, 2013 | 14.0% |
| • July 1, 2017 to June 30, 2018 | 11.0% | • July 1, 2011 to June 30, 2012 | 14.5% |
| • July 1, 2016 to June 30, 2017 | 12.0% | • July 1, 2010 to June 30, 2011 | 12.5% |
| • July 1, 2015 to June 30, 2016 | 13.5% | • July 1, 2009 to June 30, 2010 | 11.0% |
| • July 1, 2014 to June 30, 2015 | 14.0% | • Prior to July 1, 2009 | 10.5% |
| • July 1, 2013 to June 30, 2014 | 14.5% | | |

2. Summary of System Provisions

Service Credits

Prior Service

Prior service is the period of employment credited to a member who worked for a participating employer before July 1, 1961. To receive credit for prior service, the employee must have worked for a participating employer within the 30-year period prior to July 1, 1961, and the employee must become a member of the system within 15 years of July 1, 1961 (or within 15 years of the employer's participation in the system, if later).

Contributing Service

Contributing service is the member's period of employment commencing on date of participation in the system.

Credited Service

Credited service is the sum of the member's prior service and contributing service. Under certain circumstances, credited service may also be granted for periods of military service, for periods of workers' compensation, and for credited service under the West Virginia Teachers' Retirement System.

Reinstated Service

A member who terminates service with a participating employer, who does not retire and who is not eligible for a deferred vested benefit, will forfeit credited service. If the member subsequently reenters covered employment and remains employed for at least 1 year, then the forfeited credited service will be reinstated provided that the member repays to the fund any member contributions (with interest) that was withdrawn upon termination. Such repayment must commence no later than 2 years following reemployment, and full repayment must be accomplished within 5 years following reemployment.

Applied Unused Leave

A retiring member from Tier 1 may have unused sick or annual leave applied as credited service to increase the amount of the pension, but cannot apply it for purposes of gaining eligibility for benefits. Credited service for this purpose is determined by first doubling the number of unused leave days so applied, and then each 240 days of (doubled) leave counts as 1 year of credited service in the benefit formula used to compute the amount of the member's pension.

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

Normal Retirement Benefit

Eligibility

A Tier 1 member who has attained age 60 and has earned 5 or more years of contributing service is eligible for a normal retirement benefit.

A Tier 2 member who has attained age 62 and has earned 10 or more years of contributing service is eligible for a normal retirement benefit.

Amount

The annual normal retirement benefit, payable in monthly installments, is equal to 2% of the member's final average salary times the number of years of credited service.

2. Summary of System Provisions

Normal Form

The normal form of the retirement benefit is a single life cash refund annuity. This means that the pension is payable only during the member's lifetime, but if the member dies before receiving pension payments that total the amount of the accumulated contributions (with interest) at the time of retirement, then the difference will be paid to the beneficiary.

Optional Forms

The retiring member may elect an actuarially reduced joint and survivor annuity with his or her spouse as beneficiary, with either 100% or 50% of the amount payable while both are alive continuing to the surviving spouse during the spouse's remaining lifetime. This is a contingent joint and survivor annuity, which reduces in amount only if the retiree dies first (and not upon the spouse's death).

Unreduced Early Retirement Benefit (Tier 1)

Eligibility

Rule of 80, in which a Tier 1 member who has completed at least 3 years of contributing service and who has attained age 55 with the sum of age plus years of contributing service equal to or greater than 80, may retire at any age on or after age 55.

Amount

The early retirement benefit is equal to the member's normal retirement benefit based on final average salary and years of credited service as of early retirement date, without reduction for early commencement. The early retirement benefit is payable in monthly installments under the same normal or optional forms as the normal retirement benefit.

Reduced Early Retirement Benefit (Tier 1)

Eligibility

A terminating Tier 1 member who has completed at least 3 years of contributing service and who has (i) attained age 55 and completed 10 years of credited service, or (ii) has completed 30 years of credited service is eligible for early retirement and may commence benefits immediately upon termination. A terminating Tier 1 member who is under age 55 at termination, but who has completed 20 years of credited service (including 3 years of contributing service), can commence early retirement benefits upon attaining age 55.

Amount

The early retirement benefit is equal to the normal retirement benefit based on final average salary and years of credited service as of early retirement date actuarially reduced for the number of years by which the early retirement benefit commencement date precedes the retiring member's 62nd birthday. A member retiring after 30 years of service (who is not eligible for an unreduced benefit) receives a benefit actuarially reduced for the number of years by which early retirement precedes age 60. The early retirement benefit is payable in monthly installments under the same normal or optional forms as the normal retirement benefit.

2. Summary of System Provisions

Reduced Early Retirement Benefit (Tier 2)

Eligibility

A terminating Tier 2 member who has (i) attained age 60 and completed 10 years of contributing service, (ii) attained age 57 and completed 20 years of contributing service, or (iii) attained age 55 and completed 30 years of contributing service is eligible for an early retirement benefit.

Amount

The early retirement benefit is equal to the normal retirement benefit based on final average salary and years of credited service as of early retirement date actuarially reduced for the number of years by which the early retirement benefit commencement date precedes the retiring member's 62nd birthday. The early retirement benefit is payable in monthly installments under the same normal or optional forms as the normal retirement benefit.

Disability Benefit

Eligibility

A member who has completed 10 years of credited service, including 3 years of contributing service, and who is found to be totally and permanently disabled, is eligible for a disability benefit. A member with less than 10 years of credited service (or less than 3 years of contributing service) who incurs a service-connected total and permanent disability and who is receiving workers' compensation on account of this disability is also eligible for a disability benefit.

Amount

The monthly disability benefit is 2% of the member's final average salary times credited service when disabled. Prior to age 65, the disability benefit is not less than 50% of the member's final average salary. At age 65, the benefit is the greater of (i) 2% of the member's final average salary times credited service at the time of disablement or (ii) 20% of the member's final average salary.

Deferred Vested Benefit (Tier 1)

Eligibility

A terminating Tier 1 member who has completed 5 years of credited service, including at least 3 years of contributing service, and who does not withdraw his or her accumulated contributions, is entitled to a deferred vested benefit commencing at the earlier of age 62 and Rule of 80.

Amount

The deferred vested pension is equal to 2% of the member's final average salary times years of credited service. The deferred vested pension benefit is payable in monthly installments under the same normal or optional forms as the normal retirement benefit.

2. Summary of System Provisions

Deferred Vested Benefit (Tier 2)

Eligibility

A terminating Tier 2 member who has completed 10 years of contributing service, and who does not withdraw his or her accumulated contributions, is entitled to a deferred vested benefit commencing at age 64. The deferred vested benefit may commence earlier at age 63 if the member has completed 20 years of contributing service.

Amount

The deferred vested pension is equal to 2% of the member's final average salary times years of credited service. The deferred vested pension benefit is payable in monthly installments under the same normal or optional forms as the normal retirement benefit.

Pre-Retirement Death Benefits

Eligibility

A life annuity is paid to the surviving spouse or other designated beneficiary of an active member (or former member entitled to a deferred benefit) who dies after completing 10 years of credited service and before retiring. If a member has no spouse or designated beneficiary, his or her children (if any) receive annuities until they reach age 21 or marry, if earlier. If there is no spouse, child, or qualified beneficiary, or if the member dies with less than 10 years of credited service, then the member's accumulated contributions will be paid to the estate as a death benefit.

Amount

The spouse's or designated beneficiary's pension is calculated as if the member had retired on the date of death and elected a 100% joint and survivor annuity with the spouse or designated beneficiary as co-annuitant. There is no reduction for early commencement of benefits.

The amount of a (non-designated beneficiary) surviving child's annuity is based upon the annuity reserve the member would have had if the member retired on the date of death. This annuity is payable until the child reaches age 21 or is married, if earlier. In no event is a surviving child paid more than \$250 monthly, and the total paid to all surviving children will not exceed 60% of the member's final average salary.

Post-Retirement Death Benefits

Other than the death benefit inherent in the cash refund feature of the normal form of benefit, or the survivor's annuity in the case of a joint and survivor pension, no post-retirement death benefits are payable under this retirement system.

Other Terminations

A member who terminates employment other than by death and prior to becoming eligible for a normal retirement, early retirement, deferred vested, or disability benefit, may upon request receive a refund of his or her contributions. If the member has at least 2 years of service in the system, the refund will include accrued interest on the member's contributions. After receiving a refund of contributions, a member has no further right to benefits under this retirement system.

Minimum Benefits Established under HB 3095

Under HB 3095, a minimum monthly benefit of \$750 was established for pensioners as of June 3, 2019 who had completed at least 25 years of service. A corresponding minimum of \$375 was set for beneficiaries in pay status under the 50% joint-and-survivor annuity option where the original member had completed at least 25 years of service.

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 date of hire.

Basis for Assumptions

Experience studies are performed at least once in every 5-year period. The valuation was prepared using demographic assumptions recommended based on the July 1, 2013 – June 30, 2018 Experience Study, which were adopted by the Board. These assumptions will remain in effect for valuation purposes until the Board adopts revised demographic assumptions.

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 – June 30, 2020 Experience Study. These assumptions will remain in effect for valuation purposes until the Board adopts revised economic 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:

- State 2.75% to 5.55% per year
- Nonstate 3.60% to 6.75% per year

Pre-Retirement Mortality

Pub-2010 General Employees table, below-median, headcount-weighted, projected generationally with scale MP-2018

Post-Retirement Mortality

The post-retirement mortality tables are as follows:

- Retired males 108% of Pub-2010 General Retiree male table, below-median, headcount-weighted, projected generationally with scale MP-2018
- Retired females 122% of Pub-2010 General Retiree female table, below-median, headcount-weighted, projected generationally with scale MP-2018
- Disabled males 118% of Pub-2010 General / Teachers Disabled male table, headcount-weighted, projected generationally with scale MP-2018
- Disabled females 117% of Pub-2010 General / Teachers Disabled female table, headcount-weighted, projected generationally with scale MP-2018

3. Actuarial Assumptions and Methods

- Beneficiary males ¹ 112% of Pub-2010 Contingent Survivor male table, below-median, headcount-weighted, projected generationally with scale MP-2018
- Beneficiary females ¹ 115% of Pub-2010 Contingent Survivor female table, below-median, headcount-weighted, projected generationally with scale MP-2018

Withdrawal from Service

Withdrawal rates are shown in the Appendix. Withdrawals are assumed to result in a refund of contributions if non-vested or a deferred annuity if vested. The liability for a refund of contributions for nonactive non-vested members as of the valuation date is assumed to be 60% of the total employee contribution balance of such members.

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

Noncontributory service for active members is estimated from member's contributory service by adjusting the present value of benefits projected from contributory service alone. The assumed service loads are as follows:

	<u>Tier 1</u>	<u>Tier 2</u>
• Male – State	10.10%	0.00%
• Male – Nonstate	8.80%	0.00%
• Female – State	3.20%	0.00%
• Female – Nonstate	2.80%	0.00%

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

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, 2009 for the experience for the trust year ending June 30, 2009.
- 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

For the July 1, 2021 actuarial valuation, the following assumptions were changed:

- The interest rate was decreased from 7.50% to 7.25%.
- The assumed inflation rate was decreased from 3.00% to 2.75%.
- The salary scales were updated since the prior valuation. A description of the previous year's assumed salary increases is shown in our July 1, 2020 valuation report. The updated salary scales are shown in detail on the next page.

Appendix – Detailed Assumptions

Salary Scales

Age	State	Nonstate	Age	State	Nonstate
19	5.550%	6.750%	45	4.425%	4.225%
20	5.550	6.750	46	4.400	4.200
21	5.500	6.490	47	4.375	4.175
22	5.450	6.230	48	4.350	4.150
23	5.400	5.970	49	4.275	4.125
24	5.350	5.710	50	4.200	4.100
25	5.300	5.450	51	4.125	4.050
26	5.250	5.330	52	4.050	4.000
27	5.200	5.210	53	3.963	3.950
28	5.150	5.090	54	3.875	3.900
29	5.100	4.970	55	3.788	3.850
30	5.050	4.850	56	3.700	3.800
31	5.000	4.800	57	3.613	3.750
32	4.950	4.750	58	3.525	3.700
33	4.900	4.700	59	3.438	3.650
34	4.850	4.650	60	3.350	3.600
35	4.800	4.600	61	3.290	3.600
36	4.750	4.550	62	3.230	3.600
37	4.700	4.500	63	3.170	3.600
38	4.650	4.450	64	3.110	3.600
39	4.600	4.400	65	3.050	3.600
40	4.550	4.350	66	2.990	3.600
41	4.525	4.325	67	2.930	3.600
42	4.500	4.300	68	2.870	3.600
43	4.475	4.275	69	2.810	3.600
44	4.450	4.250	70+	2.750	3.600

Appendix – Detailed Assumptions

Withdrawal Rates for State (less than 1 year)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.33800	0.29900	33	0.33167	0.27164	47	0.23423	0.20721
20	0.45630	0.37375	34	0.32533	0.26476	48	0.23052	0.20392
21	0.44717	0.36628	35	0.30826	0.25789	49	0.22680	0.20063
22	0.44034	0.35880	36	0.30014	0.25445	50	0.21294	0.19734
23	0.43349	0.35133	37	0.29609	0.25101	51	0.20939	0.19405
24	0.42665	0.34385	38	0.29203	0.24757	52	0.20584	0.19076
25	0.40205	0.30947	39	0.28798	0.24413	53	0.20229	0.18747
26	0.39546	0.30603	40	0.27209	0.23023	54	0.19874	0.18418
27	0.38887	0.30259	41	0.26820	0.22694	55	0.19520	0.16445
28	0.38228	0.29915	42	0.26432	0.22365	56	0.19520	0.16445
29	0.37349	0.29571	43	0.26043	0.22036	57	0.19520	0.16445
30	0.35068	0.29227	44	0.25654	0.21707	58	0.19520	0.16445
31	0.34434	0.28540	45	0.24167	0.21379	59	0.19520	0.16445
32	0.33800	0.27852	46	0.23795	0.21050	60	0.19520	0.16445

Withdrawal Rates for State (1 to 2 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.31500	0.24750	33	0.25200	0.22385	47	0.18480	0.15900
20	0.35280	0.29700	34	0.24360	0.21780	48	0.18480	0.15600
21	0.34608	0.29370	35	0.23520	0.21175	49	0.18480	0.15300
22	0.33936	0.29040	36	0.22848	0.20570	50	0.16706	0.15000
23	0.33264	0.28710	37	0.22176	0.19965	51	0.16403	0.14700
24	0.32592	0.28380	38	0.21504	0.19360	52	0.16099	0.14400
25	0.31920	0.25713	39	0.20832	0.18755	53	0.15795	0.14100
26	0.31080	0.25410	40	0.20160	0.18000	54	0.15491	0.13800
27	0.30240	0.25108	41	0.19824	0.17700	55	0.15188	0.13500
28	0.29400	0.24805	42	0.19488	0.17400	56	0.15188	0.13500
29	0.28560	0.24503	43	0.19152	0.17100	57	0.15188	0.13500
30	0.27720	0.24200	44	0.18816	0.16800	58	0.15188	0.13500
31	0.26880	0.23595	45	0.18480	0.16500	59	0.15188	0.13500
32	0.26040	0.22990	46	0.18480	0.16200	60	0.15188	0.13500

Appendix – Detailed Assumptions

Withdrawal Rates for State (2 to 3 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.28405	0.26000	33	0.19136	0.18825	47	0.11825	0.13438
20	0.28405	0.26000	34	0.18538	0.18428	48	0.11550	0.13125
21	0.27807	0.25675	35	0.17940	0.18031	49	0.11275	0.12813
22	0.27209	0.25350	36	0.17342	0.17634	50	0.11000	0.13750
23	0.26611	0.25025	37	0.16744	0.17237	51	0.10725	0.13407
24	0.26013	0.24700	38	0.16146	0.16840	52	0.10450	0.13063
25	0.25415	0.21563	39	0.15548	0.16443	53	0.10175	0.12719
26	0.24518	0.21275	40	0.14950	0.16046	54	0.09900	0.12375
27	0.23621	0.20988	41	0.14651	0.15649	55	0.09625	0.12032
28	0.22724	0.20700	42	0.14352	0.15252	56	0.09350	0.11688
29	0.21827	0.20413	43	0.14053	0.14855	57	0.09075	0.11344
30	0.20930	0.20016	44	0.13754	0.14458	58	0.08800	0.11000
31	0.20332	0.19619	45	0.12375	0.14063	59	0.08525	0.10657
32	0.19734	0.19222	46	0.12100	0.13750	60	0.08250	0.10313

Withdrawal Rates for State (3 to 4 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.22880	0.20160	33	0.15444	0.16330	47	0.09438	0.11038
20	0.22880	0.21168	34	0.14872	0.15725	48	0.09152	0.10886
21	0.22308	0.20866	35	0.14300	0.15750	49	0.08866	0.10735
22	0.21736	0.20563	36	0.13728	0.15120	50	0.08580	0.10584
23	0.21164	0.20261	37	0.13156	0.14490	51	0.08294	0.10282
24	0.20592	0.19958	38	0.12584	0.13860	52	0.08008	0.09979
25	0.20020	0.19656	39	0.12012	0.13230	53	0.07722	0.09677
26	0.19448	0.19354	40	0.11440	0.12600	54	0.07436	0.09374
27	0.18876	0.19051	41	0.11154	0.12443	55	0.07150	0.09072
28	0.18304	0.18749	42	0.10868	0.12285	56	0.06864	0.08770
29	0.17732	0.18446	43	0.10582	0.12128	57	0.06578	0.08467
30	0.17160	0.18144	44	0.10296	0.11970	58	0.06292	0.08165
31	0.16588	0.17539	45	0.10010	0.11340	59	0.06006	0.07862
32	0.16016	0.16934	46	0.09724	0.11189	60	0.05720	0.07560

Appendix – Detailed Assumptions

Withdrawal Rates for State (4 to 5 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.19110	0.18225	33	0.11642	0.13650	47	0.08453	0.09588
20	0.19110	0.18225	34	0.11113	0.13325	48	0.08085	0.09507
21	0.18522	0.18043	35	0.12096	0.13000	49	0.07718	0.09425
22	0.17934	0.17861	36	0.11491	0.12675	50	0.07700	0.08626
23	0.17346	0.17678	37	0.10886	0.12350	51	0.07315	0.08476
24	0.16758	0.17496	38	0.10282	0.12025	52	0.06930	0.08326
25	0.14553	0.16673	39	0.09677	0.11700	53	0.06545	0.08176
26	0.14288	0.16497	40	0.10500	0.11375	54	0.06160	0.08026
27	0.14024	0.16322	41	0.10150	0.11050	55	0.06038	0.07876
28	0.13759	0.16146	42	0.09800	0.10725	56	0.05635	0.07500
29	0.13495	0.15971	43	0.09450	0.10400	57	0.05233	0.07126
30	0.13230	0.14625	44	0.09100	0.10075	58	0.04830	0.06750
31	0.12701	0.14300	45	0.09188	0.09750	59	0.04428	0.06376
32	0.12172	0.13975	46	0.08820	0.09669	60	0.04025	0.06000

Withdrawal Rates for State (greater than 5 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.10200	0.12100	33	0.08784	0.08938	47	0.03900	0.04940
20	0.12240	0.12100	34	0.08352	0.08250	48	0.03600	0.04810
21	0.11750	0.11880	35	0.07590	0.07425	49	0.03300	0.04680
22	0.11261	0.11660	36	0.07176	0.07155	50	0.03900	0.04550
23	0.10771	0.11440	37	0.06762	0.06885	51	0.03510	0.04160
24	0.10282	0.11220	38	0.06348	0.06615	52	0.03120	0.03770
25	0.11520	0.12100	39	0.05934	0.06345	53	0.02730	0.03380
26	0.11232	0.11616	40	0.06000	0.05850	54	0.02340	0.02990
27	0.10944	0.11132	41	0.05700	0.05720	55	0.03000	0.04550
28	0.10656	0.10648	42	0.05400	0.05590	56	0.03000	0.04095
29	0.10368	0.10164	43	0.05100	0.05460	57	0.03000	0.03640
30	0.10080	0.11000	44	0.04800	0.05330	58	0.03000	0.03185
31	0.09648	0.10313	45	0.04500	0.05200	59	0.03000	0.02730
32	0.09216	0.09625	46	0.04200	0.05070	60	0.03000	0.02275

Appendix – Detailed Assumptions

Withdrawal Rates for Nonstate (less than 1 year)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.31200	0.31625	33	0.28704	0.26439	47	0.20976	0.21252
20	0.35880	0.31625	34	0.28152	0.25933	48	0.20424	0.20493
21	0.35328	0.31246	35	0.27600	0.25300	49	0.19872	0.19734
22	0.34776	0.30866	36	0.27048	0.25047	50	0.19320	0.18975
23	0.34224	0.30487	37	0.26496	0.24794	51	0.18768	0.18469
24	0.33672	0.30107	38	0.25944	0.24541	52	0.18216	0.17963
25	0.33120	0.29601	39	0.25392	0.24288	53	0.17664	0.17457
26	0.32568	0.29222	40	0.24840	0.24035	54	0.17112	0.16951
27	0.32016	0.28842	41	0.24288	0.23782	55	0.16560	0.16445
28	0.31464	0.28463	42	0.23736	0.23529	56	0.16008	0.16192
29	0.30912	0.28083	43	0.23184	0.23276	57	0.15456	0.15939
30	0.30360	0.27577	44	0.22632	0.23023	58	0.15180	0.15686
31	0.29808	0.27198	45	0.22080	0.22770	59	0.15180	0.15433
32	0.29256	0.26818	46	0.21528	0.22011	60	0.15180	0.15180

Withdrawal Rates for Nonstate (1 to 2 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.25200	0.24150	33	0.22752	0.21160	47	0.13920	0.14200
20	0.30240	0.24150	34	0.22176	0.20930	48	0.13680	0.13800
21	0.29952	0.23920	35	0.21600	0.20700	49	0.13440	0.13400
22	0.29664	0.23690	36	0.21024	0.20355	50	0.13200	0.13000
23	0.29376	0.23460	37	0.20448	0.20010	51	0.12960	0.12800
24	0.29088	0.23230	38	0.19872	0.19665	52	0.12720	0.12600
25	0.28800	0.23000	39	0.19296	0.19320	53	0.12480	0.12400
26	0.27936	0.22770	40	0.18720	0.18975	54	0.12240	0.12200
27	0.27072	0.22540	41	0.18432	0.18630	55	0.12000	0.12000
28	0.26208	0.22310	42	0.18144	0.18285	56	0.12000	0.11800
29	0.25344	0.22080	43	0.17856	0.17940	57	0.12000	0.11600
30	0.24480	0.21850	44	0.17568	0.17595	58	0.12000	0.11400
31	0.23904	0.21620	45	0.14400	0.15000	59	0.12000	0.11200
32	0.23328	0.21390	46	0.14160	0.14600	60	0.12000	0.11000

Appendix – Detailed Assumptions

Withdrawal Rates for Nonstate (2 to 3 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.27500	0.25080	33	0.17182	0.18852	47	0.11880	0.12369
20	0.27500	0.23826	34	0.16456	0.18622	48	0.11520	0.12070
21	0.27088	0.23575	35	0.17160	0.17556	49	0.11160	0.11771
22	0.26675	0.23324	36	0.16764	0.17117	50	0.10800	0.12564
23	0.26263	0.23074	37	0.16368	0.16678	51	0.10680	0.12345
24	0.25850	0.22823	38	0.15972	0.16239	52	0.10560	0.12127
25	0.25438	0.21632	39	0.15576	0.15800	53	0.10440	0.11908
26	0.24750	0.21391	40	0.15180	0.13965	54	0.10320	0.11690
27	0.24063	0.21151	41	0.14916	0.13766	55	0.10200	0.11471
28	0.23375	0.20910	42	0.14652	0.13566	56	0.10080	0.11253
29	0.22688	0.20670	43	0.14388	0.13367	57	0.09960	0.11034
30	0.19360	0.19542	44	0.14124	0.13167	58	0.09840	0.10816
31	0.18634	0.19312	45	0.12600	0.12968	59	0.09720	0.10597
32	0.17908	0.19082	46	0.12240	0.12668	60	0.09600	0.10379

Withdrawal Rates for Nonstate (3 to 4 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.20900	0.18000	33	0.14762	0.14300	47	0.09460	0.10600
20	0.20900	0.18000	34	0.14036	0.13900	48	0.09240	0.10400
21	0.20460	0.17800	35	0.13310	0.13500	49	0.09020	0.10200
22	0.20020	0.17600	36	0.13068	0.13400	50	0.08800	0.10000
23	0.19580	0.17400	37	0.12826	0.13300	51	0.08580	0.09800
24	0.19140	0.17200	38	0.12584	0.13200	52	0.08360	0.09600
25	0.18700	0.17000	39	0.12342	0.13100	53	0.08140	0.09400
26	0.18040	0.16700	40	0.11000	0.13000	54	0.07920	0.09200
27	0.17380	0.16400	41	0.10780	0.12600	55	0.07700	0.09000
28	0.16720	0.16100	42	0.10560	0.12200	56	0.07480	0.08800
29	0.16060	0.15800	43	0.10340	0.11800	57	0.07260	0.08600
30	0.16940	0.15500	44	0.10120	0.11400	58	0.07040	0.08400
31	0.16214	0.15100	45	0.09900	0.11000	59	0.06820	0.08200
32	0.15488	0.14700	46	0.09680	0.10800	60	0.06600	0.08000

Appendix – Detailed Assumptions

Withdrawal Rates for Nonstate (4 to 5 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.20400	0.20400	33	0.10272	0.12768	47	0.08784	0.08664
20	0.16320	0.19380	34	0.09696	0.12084	48	0.08496	0.08436
21	0.15840	0.18924	35	0.13680	0.11400	49	0.08208	0.08208
22	0.15360	0.18468	36	0.13104	0.11172	50	0.07920	0.07980
23	0.14880	0.18012	37	0.12528	0.10944	51	0.07632	0.07752
24	0.14400	0.17556	38	0.11952	0.10716	52	0.07344	0.07524
25	0.13920	0.17100	39	0.11376	0.10488	53	0.07056	0.07296
26	0.13536	0.16644	40	0.10800	0.10260	54	0.06768	0.07068
27	0.13152	0.16188	41	0.10512	0.10032	55	0.06480	0.06840
28	0.12768	0.15732	42	0.10224	0.09804	56	0.06192	0.06612
29	0.12384	0.15276	43	0.09936	0.09576	57	0.05904	0.06384
30	0.12000	0.14820	44	0.09648	0.09348	58	0.05616	0.06156
31	0.11424	0.14136	45	0.09360	0.09120	59	0.05328	0.05928
32	0.10848	0.13452	46	0.09072	0.08892	60	0.05040	0.05700

Withdrawal Rates for Nonstate (greater than 5 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.17325	0.16800	33	0.09222	0.07920	47	0.04761	0.04356
20	0.15593	0.15120	34	0.08880	0.07560	48	0.04554	0.04059
21	0.14969	0.14553	35	0.07763	0.07920	49	0.04347	0.03762
22	0.14345	0.13986	36	0.07452	0.07623	50	0.04600	0.04200
23	0.13721	0.13419	37	0.07142	0.07326	51	0.04370	0.03960
24	0.13098	0.12852	38	0.06831	0.07029	52	0.04140	0.03720
25	0.12474	0.11700	39	0.06521	0.06732	53	0.03910	0.03480
26	0.11850	0.11160	40	0.06210	0.06435	54	0.03680	0.03240
27	0.11227	0.10620	41	0.06003	0.06138	55	0.03750	0.03250
28	0.10603	0.10080	42	0.05796	0.05841	56	0.03500	0.03120
29	0.09979	0.09540	43	0.05589	0.05544	57	0.03250	0.02990
30	0.10247	0.09000	44	0.05382	0.05247	58	0.03000	0.02860
31	0.09905	0.08640	45	0.05175	0.04950	59	0.02750	0.02730
32	0.09563	0.08280	46	0.04968	0.04653	60	0.02500	0.02600

Appendix – Detailed Assumptions

Disability Rates for State and Nonstate

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.00000	0.00000	33	0.00028	0.00045	47	0.00254	0.00180
20	0.00006	0.00005	34	0.00030	0.00047	48	0.00286	0.00195
21	0.00006	0.00009	35	0.00033	0.00049	49	0.00319	0.00210
22	0.00008	0.00013	36	0.00042	0.00054	50	0.00351	0.00225
23	0.00009	0.00017	37	0.00052	0.00059	51	0.00378	0.00285
24	0.00010	0.00021	38	0.00062	0.00064	52	0.00406	0.00345
25	0.00011	0.00025	39	0.00071	0.00068	53	0.00432	0.00405
26	0.00013	0.00027	40	0.00082	0.00073	54	0.00459	0.00465
27	0.00015	0.00031	41	0.00103	0.00078	55	0.00486	0.00341
28	0.00018	0.00033	42	0.00125	0.00083	56	0.00497	0.00366
29	0.00019	0.00036	43	0.00146	0.00088	57	0.00508	0.00390
30	0.00022	0.00039	44	0.00168	0.00093	58	0.00518	0.00415
31	0.00024	0.00041	45	0.00190	0.00150	59	0.00530	0.00439
32	0.00026	0.00043	46	0.00222	0.00165	60	0.00540	0.00488

Retirement Rates for State and Nonstate

Age	Rates
55	0.30
56	0.18
57	0.15
58	0.15
59	0.15
60	0.12
61	0.15
62	0.22
63	0.15
64	0.18
65	0.25
66	0.20
67	0.20
68	0.20
69	0.20
70+	1.00