

West Virginia Public Employees' Retirement System

Actuarial Valuation as of July 1, 2017

March 2018

March 28, 2018

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, 2017. This valuation presents the annual cost and related liabilities of the System as of the valuation date.

The valuation results indicate that the expected state contributions of 11.0% 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 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, 2017, maintained by the West Virginia Consolidated Public Retirement Board, and financial information received from the West Virginia Investment Management Board.

This report presents fairly the actuarial position of the West Virginia Public Employees' Retirement System as of July 1, 2017, in accordance with Actuarial Standards of Practice 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. In particular, 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.

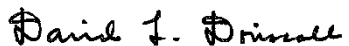
Where presented, references to “funded ratio” and “unfunded accrued liability” typically are measured on an actuarial value of assets basis. It should be noted that the same measurements using market value of assets would result in different funded ratios and unfunded accrued liabilities. Moreover, the funded ratio presented 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.

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.

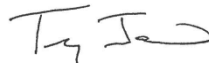
Use of this report for any other purpose may not be appropriate and may result in mistaken conclusions due to failure to understand applicable assumptions, methodologies, or inapplicability of the report for that purpose. Because of the risk of misinterpretation of actuarial results, Conduent should be asked to review any statement to be made on the basis of the results contained in this report. Conduent will not accept any liability for any such statement made without such 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.

Conduent HR Consulting, LLC



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1. Summary of Valuation

This report presents the results of the July 1, 2017, 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, 2016, 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 11.0% 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 18-year period (30 years from July 1, 2005).

Comments on Valuation Results

Table 1 presents the development of the valuation results as of July 1, 2017, and, for comparison purposes, July 1, 2016. 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 actuarial liability segments over the specified periods.

The actual unfunded liability of approximately \$584.1 million differed from the expected amount of approximately \$684.4 million, primarily due to the following reasons:

- The demographic experience resulted in a net liability loss of approximately \$8.1 million. This loss was the result of the pay increase experience, higher turnover than expected, and more pensioner deaths than expected. These losses were partially offset by gains resulting from fewer retirements than expected, as well as lower benefit payments than expected.
- The return on the actuarial value of assets for the year ending June 30, 2017, was approximately 9.37%, which was higher than the assumed return of 7.50%. This resulted in an asset gain of approximately \$108.4 million.

Table 2 presents a projection of the unfunded actuarial accrued liability to June 30, 2035. As noted above, the unfunded actuarial accrued liability at the valuation date is approximately \$584.1 million. This table illustrates the expected pattern of change in the unfunded liability over the remaining 18-year period.

Table 3 presents a cash flow projection of expected asset balances, contributions, benefit payments, and earnings over the period to FY 2042.

1. Summary of Valuation

Funding Progress

Table 4a presents the market value and actuarial value of assets for the fiscal year ending June 30, 2017 and, for comparison purposes, the fiscal year ending June 30, 2016. Table 4b presents the 4-year smoothing of deferred gains and losses used in the calculation of the actuarial value of assets. Table 5 presents the change in market value of assets for the fiscal year ending June 30, 2017.

System Membership

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

Group	July 1, 2017	July 1, 2016
Actives	36,094	36,150
Retirees and Beneficiaries	27,053	26,293
Terminated Vested	4,301	4,214
Terminated Non-Vested	<u>17,752</u>	<u>16,474</u>
Total	85,200	83,131

Table 6 presents a reconciliation of system membership over the year and Table 7 presents supplemental information on system membership.

Tables 8a and 8b show the number and total compensation for State and Nonstate active members by 5-year age and service groupings as of July 1, 2017.

Table 9 shows the number and average monthly benefits of retirees and beneficiaries included in the valuation distributed by fifth age group. Table 10 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, 2017	July 1, 2016
Membership:		
• Active	36,094	36,150
• Inactive	49,106	46,981
• Total	<u>85,200</u>	<u>83,131</u>
1. Present Value of Future Benefits		
a. Active	\$ 3,720,987	\$ 3,700,519
b. Inactive:		
• Retirees	3,277,840	3,098,195
• Disabled Retirees	224,359	223,768
• Beneficiaries	308,931	300,952
• Vested Terminated	176,007	169,509
• Non-Vested Terminated	16,149	13,921
c. Total	<u>\$ 7,724,273</u>	<u>\$ 7,506,864</u>
2. Actuarial Accrued Liability	\$ 6,832,513	\$ 6,615,406
3. Assets at Actuarial Value	\$ 6,248,413	\$ 5,888,558
4. Unfunded Actuarial Accrued Liability (2) - (3)	\$ 584,100	\$ 726,848
5. Annual Normal Cost Rate (Tier 1)		
a. Present Value of Future Normal Cost	\$ 786,682	\$ 839,817
b. Present Value of Future Payroll	\$ 8,556,639	\$ 9,045,414
c. Normal Cost Rate as a % of Payroll (5a) / (5b)	9.19%	9.28%
d. Employee Contribution Rate	4.50%	4.50%
e. Employer Share of Normal Cost	4.69%	4.78%
f. Valuation Compensation FY 2018 (2017)	\$ 1,254,846	\$ 1,323,296
6. Annual Normal Cost Rate (Tier 2)		
a. Present Value of Future Normal Cost	\$ 105,078	\$ 51,641
b. Present Value of Future Payroll	\$ 1,179,068	\$ 584,488
c. Normal Cost Rate as a % of Payroll (6a) / (6b)	8.91%	8.84%
d. Employee Contribution Rate	6.00%	6.00%
e. Employer Share of Normal Cost	2.91%	2.84%
f. Valuation Compensation FY 2018 (2017)	\$ 175,731	\$ 91,288
7. Calculated Employer Cost FY 2018 (2017)		
a. Amortization Payment on UAAL MOY ¹	\$ 58,042	\$ 70,392
b. Employer Normal Cost MOY	66,321	68,271
c. Total Employer Cost MOY	<u>\$ 124,363</u>	<u>\$ 138,663</u>
d. Employer Cost as Percentage of Compensation	8.69%	9.80%
8. Expected Employer Contributions FY 2018 (2017)		
a. Employer Contribution Rate	11.00%	12.00%
b. Employer Contribution	\$ 157,363	\$ 169,750

¹ FY 2018 amortization payment is over 18 years (30 years from July 1, 2005).

1. Summary of Valuation

Table 2
Projection of Unfunded Accrued Liability and Annual Contributions (000's omitted)
Primary Unfunded Liability Established July 1, 2005

Fiscal Year Ending 6/30	Unfunded Liability at Beg. of Year	Projected Total Payroll	Employer Contributions	
			% of Payroll	Amount
2018	\$ 584,100	\$ 1,430,577	4.06%	\$ 58,042
2019	567,728	1,484,224	3.91%	58,042
2020	550,129	1,539,882	3.77%	58,042
2021	531,209	1,597,628	3.63%	58,042
2022	510,871	1,657,539	3.50%	58,042
2023	489,007	1,719,696	3.38%	58,042
2024	465,503	1,784,185	3.25%	58,042
2025	440,236	1,851,092	3.14%	58,042
2026	413,075	1,920,508	3.02%	58,042
2027	383,876	1,992,527	2.91%	58,042
2028	352,488	2,067,247	2.81%	58,042
2029	318,745	2,144,768	2.71%	58,042
2030	282,472	2,225,197	2.61%	58,042
2031	243,478	2,308,642	2.51%	58,042
2032	201,560	2,395,216	2.42%	58,042
2033	156,497	2,485,037	2.34%	58,042
2034	108,055	2,578,226	2.25%	58,042
2035	55,980	2,674,909	2.17%	58,042

1. Summary of Valuation

Table 3
Cash Flow Projection FY 2018 through FY 2042 (000's omitted)

FY Ending 6/30	Assets Beg. of Year	Expected Contributions	Benefits	Earnings	Net Income	Assets End of Year
2018	\$ 6,385,097	\$ 224,375	\$ 455,509	\$ 470,371	\$ 239,237	\$ 6,624,334
2019	6,624,334	232,789	456,883	488,573	264,479	6,888,813
2020	6,888,813	241,519	473,704	508,111	275,926	7,164,739
2021	7,164,739	250,576	491,249	528,493	287,820	7,452,559
2022	7,452,559	259,973	508,535	549,789	301,227	7,753,786
2023	7,753,786	269,722	526,143	572,092	315,671	8,069,457
2024	8,069,457	279,837	543,979	595,483	331,341	8,400,798
2025	8,400,798	290,331	561,688	620,068	348,711	8,749,509
2026	8,749,509	301,218	578,258	646,012	368,972	9,118,481
2027	9,118,481	312,514	594,657	673,497	391,354	9,509,835
2028	9,509,835	324,233	610,894	702,682	416,021	9,925,856
2029	9,925,856	336,392	626,110	733,771	444,053	10,369,909
2030	10,369,909	349,007	640,509	767,009	475,507	10,845,416
2031	10,845,416	362,095	653,635	802,671	511,131	11,356,547
2032	11,356,547	375,674	666,223	841,042	550,493	11,907,040
2033	11,907,040	389,762	677,587	882,430	594,605	12,501,645
2034	12,501,645	404,378	687,513	927,198	644,063	13,145,708
2035	13,145,708	419,542	696,034	975,747	699,255	13,844,963
2036	13,844,963	435,275	702,370	1,028,537	761,442	14,606,405
2037	14,606,405	451,598	707,108	1,086,072	830,562	15,436,967
2038	15,436,967	468,533	709,814	1,148,888	907,607	16,344,574
2039	16,344,574	486,103	710,391	1,217,584	993,296	17,337,870
2040	17,337,870	504,332	709,250	1,292,795	1,087,877	18,425,747
2041	18,425,747	523,244	706,857	1,375,170	1,191,557	19,617,304
2042	19,617,304	542,866	701,769	1,465,447	1,306,544	20,923,848

Notes:

1. Earnings are based on an assumed asset return of 7.50%.
2. The fund balance as of July 1, 2017 is the market value of the fund.
3. The contribution for FY 2018 is 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 11.0% times the anticipated FY 2018 base pay. Thereafter, the contribution is assumed to increase at 3.75% per year to reflect the salary increase assumption. No new entrants are assumed in this projection.
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.

1. Summary of Valuation

Table 4a
Actuarial Value of Assets as of June 30, 2017 (000's omitted)

	June 30, 2017	June 30, 2016
Assets		
• Cash with State Treasurer	\$ 479	\$ 2,646
• Investments at Fair Value	6,311,881	5,597,558
• Contributions Receivable	8,159	6,306
• Other Receivables	65,005	90,960
• Total Assets	<u>\$ 6,385,524</u>	<u>\$ 5,697,470</u>
Liabilities		
• Accrued Expenses and Other Payables	<u>427</u>	<u>-</u>
Market Value of Assets	\$ 6,385,097	\$ 5,697,470
Adjustments for Actuarial Value of Assets		
• Smoothing of Deferred Gains / (Losses)	\$ 71,684	\$ (276,088)
• DHSS Settlement Accrual	65,000	85,000
• Total Adjustments	<u>\$ 136,684</u>	<u>\$ (191,088)</u>
Actuarial Value of Assets	\$ 6,248,413	\$ 5,888,558

Table 4b
Four-Year Asset Smoothing as of June 30, 2017 (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
2017	\$ 435,213	75%	\$ 326,410	\$ 108,803
2016	(423,678)	50%	(211,839)	(105,920)
2015	(171,549)	25%	(42,887)	(42,887)
2014	509,783	0%	0	127,446
Total			<u>\$ 71,684</u>	<u>\$ 87,442</u>

1. Summary of Valuation

Table 5

**Changes in Market Value of Assets for Year Ended June 30, 2017
(000's omitted)**

	Amount
Market Value of Assets - Beginning of Year	\$ 5,697,470
Prior Period Adjustment	<u>(90)</u>
Market Value of Assets - Beginning of Year Restated	\$ 5,697,380
Additions:	
• Contributions:	
○ Member - Tier 1	55,859
○ Member - Tier 2	7,719
○ Employer - Tier 1	149,711
○ Employer - Tier 2	15,965
○ Reinstatements	-
○ Special Appropriation	-
○ Subtotal	<u>\$ 229,254</u>
• Investment Income:	
○ Net Appreciation ¹ and Interest	875,090
○ Other Return in Investments	-
○ Subtotal	<u>\$ 875,090</u>
• Other Income	<u>1,031</u>
• Total	<u>\$ 1,105,375</u>
Deductions and Transfers:	
• Benefit Expense	402,213
• Refunds of Contributions	10,566
• Administrative Expenses	4,989
• Transfers to / (from) Other Systems	<u>(110)</u>
• Total	<u>\$ 417,658</u>
Net Increase	687,717
Market Value of Assets - End of Year	\$ 6,385,097
Investment Return for Year on Market Value:	
• Valuation Purposes (assumes mid-year transactions and offsets investment income by investment and administrative expense)	15.52%
• Per Investment Management Board (time-weighted, excluding administrative expense)	15.80%

¹ Net of investment expense

1. Summary of Valuation

Table 6
Reconciliation of System Members

	Active	Non-Vested Terms	Vested Terms	Service Retirees	Disabled Retirees	Beneficiaries	Total
Census as of July 1, 2016	36,150	16,474	4,214	19,878	2,312	4,103	83,131
• New Entrants	3,845	810	-	-	-	-	4,655
• Returned to Active Status	734	(504)	(208)	(20)	(2)	-	-
• Terminated Non-Vested	(1,485)	1,519	(34)	-	-	-	-
• Terminated Vested	(658)	(1)	659	-	-	-	-
• Withdrew Contributions	(1,086)	(473)	(126)	-	-	-	(1,685)
• Transferred out	(1)	(1)	-	-	-	-	(2)
• Retired	(1,258)	(5)	(160)	1,423	-	-	-
• Disabled	(71)	(1)	(24)	-	96	-	-
• Deceased	(74)	(42)	(19)	(649)	(118)	(187)	(1,089)
• New Beneficiaries	-	-	-	-	-	224	224
• New QDRO's	-	-	-	-	-	15	15
• Adjustments	<u>(2)</u>	<u>(24)</u>	<u>(1)</u>	<u>(9)</u>	<u>(2)</u>	<u>(11)</u>	<u>(49)</u>
Census as of July 1, 2017	36,094	17,752	4,301	20,623	2,286	4,144	85,200

1. Summary of Valuation

Table 7
Summary of Membership and Payroll

	July 1, 2017	July 1, 2016
Active Members		
• State Employees	23,466	23,732
• Nonstate Employees	<u>12,628</u>	<u>12,418</u>
• Total	36,094	36,150
• Tier 1 Employees	30,088	32,969
• Tier 2 Employees	<u>6,006</u>	<u>3,181</u>
• Total	36,094	36,150
• Average Age	46.67	46.71
• Average Service	10.58	10.65
Inactive Members		
• Service Retirees	20,623	19,878
• Disabled Retirees	2,286	2,312
• Beneficiaries	4,144	4,103
• Vested Terminated	4,301	4,214
• Non-Vested Terminated	<u>17,752</u>	<u>16,474</u>
• Total	49,106	46,981
Payroll for Normal Cost		
• State Employees	\$ 950,568,000	\$ 942,444,000
• Nonstate Employees	<u>480,010,000</u>	<u>472,141,000</u>
• Total	\$ 1,430,578,000	\$ 1,414,585,000
PV of Future Payroll	\$ 9,735,707,000	\$ 9,629,902,000
PV of Member Contributions	\$ 455,793,000	\$ 442,113,000

1. Summary of Valuation

Table 8a
Distribution of Active Members as of July 1, 2017 - State

Attained Age	Years of Credited 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	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	974 / 26,787,393	9 / 388,633	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	983 / 27,176,026	
25 - 29	1,432 / 45,869,268	270 / 10,097,932	1 / 30,155	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	1,703 / 55,997,355	
30 - 34	1,046 / 34,304,964	733 / 28,969,005	175 / 7,246,483	6 / 252,049	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	1,960 / 70,772,501	
35 - 39	1,022 / 34,214,354	749 / 29,307,826	512 / 22,705,718	170 / 7,712,346	3 / 106,445	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	2,456 / 94,046,689	
40 - 44	958 / 30,950,024	633 / 25,965,196	509 / 22,720,836	559 / 26,895,329	172 / 8,954,532	5 / 202,508	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	2,836 / 115,688,425	
45 - 49	990 / 33,247,275	731 / 29,517,095	520 / 21,345,949	588 / 27,224,323	520 / 28,038,534	156 / 8,713,632	10 / 509,787	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	3,515 / 148,596,595	
50 - 54	809 / 26,532,073	683 / 26,574,734	529 / 22,149,251	489 / 22,238,566	410 / 20,903,343	416 / 22,954,536	168 / 8,981,015	24 / 1,173,534	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	3,528 / 151,507,052	
55 - 59	651 / 22,624,060	618 / 24,017,931	464 / 19,161,109	530 / 23,437,478	388 / 19,249,172	267 / 13,795,042	216 / 12,298,886	138 / 7,133,378	14 / 637,865	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	3,286 / 142,354,921	
60 - 64	340 / 12,605,608	444 / 17,897,506	366 / 14,768,277	341 / 15,259,992	255 / 12,103,767	202 / 10,861,405	133 / 7,157,795	126 / 7,398,853	65 / 3,439,605	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	2,272 / 101,492,808	
65 - 69	95 / 3,726,341	146 / 5,858,371	116 / 4,969,357	124 / 5,752,780	66 / 3,204,232	55 / 2,942,721	35 / 1,984,824	31 / 1,830,451	35 / 703	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	703 / 32,468,163	
70 & up	24 / 1,165,718	34 / 1,347,612	35 / 1,458,937	47 / 1,945,532	24 / 1,161,043	15 / 685,760	12 / 722,156	6 / 344,645	27 / 1,635,677	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	224 / 10,467,080	
Total	8,341 / 272,027,078	5,050 / 199,941,841	3,227 / 136,556,072	2,854 / 130,718,395	1,838 / 93,721,068	1,116 / 60,155,604	574 / 31,654,463	325 / 17,880,861	141 / 7,912,233	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	23,466 / 950,567,615	

1. Summary of Valuation

Table 8b
Distribution of Active Members as of July 1, 2017 - Nonstate

Attained Age	Years of Credited Service										Total
	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 & up	Total	
	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	Count / Total Comp	
Under 25	596 / 15,593,146	17 / 553,652	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	613 / 16,146,798
25 - 29	777 / 24,409,051	162 / 5,705,024	8 / 273,603	- / -	- / -	- / -	- / -	- / -	- / -	- / -	947 / 30,387,678
30 - 34	595 / 19,276,032	313 / 11,953,291	105 / 4,307,655	5 / 252,287	- / -	- / -	- / -	- / -	- / -	- / -	1,018 / 35,789,265
35 - 39	597 / 19,055,150	327 / 12,796,849	260 / 11,687,908	79 / 3,478,848	6 / 256,223	- / -	- / -	- / -	- / -	- / -	1,269 / 47,274,978
40 - 44	550 / 17,487,753	308 / 11,398,110	239 / 10,385,192	212 / 10,000,057	87 / 4,252,928	2 / 104,068	- / -	- / -	- / -	- / -	1,398 / 53,628,108
45 - 49	568 / 18,316,069	315 / 11,740,436	293 / 11,839,908	256 / 11,674,883	179 / 8,880,261	96 / 4,731,171	4 / 209,267	- / -	- / -	- / -	1,711 / 67,391,995
50 - 54	489 / 16,321,993	348 / 12,712,326	300 / 11,825,601	246 / 10,893,591	189 / 9,132,247	176 / 7,954,503	102 / 5,265,933	11 / 556,473	- / -	- / -	1,861 / 74,662,667
55 - 59	434 / 14,614,290	345 / 12,476,446	292 / 11,282,339	283 / 11,901,712	200 / 8,979,536	150 / 7,596,835	88 / 4,726,787	67 / 3,461,436	6 / 268,821	- / -	1,865 / 75,308,202
60 - 64	256 / 8,990,841	206 / 7,441,648	225 / 9,068,792	171 / 7,146,437	139 / 5,922,850	97 / 4,752,665	63 / 3,448,108	53 / 2,708,449	22 / 1,215,455	- / -	1,232 / 50,695,245
65 - 69	86 / 2,902,051	87 / 2,861,466	80 / 3,360,809	76 / 3,495,409	47 / 2,026,770	43 / 1,830,939	30 / 1,665,054	20 / 1,013,731	13 / 845,192	- / -	482 / 20,001,421
70 & up	42 / 1,587,503	33 / 865,500	44 / 1,467,281	38 / 1,382,885	29 / 1,194,561	17 / 707,909	6 / 240,157	7 / 347,356	16 / 930,449	- / -	232 / 8,723,601
Total	4,990 / 158,553,879	2,461 / 90,504,748	1,846 / 75,499,088	1,366 / 60,226,109	876 / 40,645,376	581 / 27,678,090	293 / 15,555,306	158 / 8,087,445	57 / 3,259,917	- / -	12,628 / 480,009,958

1. Summary of Valuation

Table 9
Distribution of Retired Members as of July 1, 2017

Current Age	Service Retirees			Disabled Retirees		
	Count	Avg. Age	Avg. Mo. Benefit	Count	Avg. Age	Avg. Mo. Benefit
Under 30	-	-	-	-	-	-
30 - 34	-	-	-	-	-	-
35 - 39	-	-	-	6	38	1,277
40 - 44	-	-	-	24	43	1,135
45 - 49	-	-	-	78	47	1,346
50 - 54	2	52	986	160	52	1,300
55 - 59	1,066	58	2,231	382	57	1,362
60 - 64	3,440	62	1,757	521	62	1,200
65 - 69	5,602	67	1,524	527	67	778
70 - 74	4,157	72	1,391	310	72	688
75 - 79	2,827	77	1,139	154	77	513
80 - 84	1,824	82	965	76	82	455
85 - 89	1,105	87	779	28	87	397
90 - 94	496	92	673	17	92	395
95 & over	104	97	542	3	96	189
Total	20,623	71	1,405	2,286	64	984
Total Annual Benefits			347,707,092	26,984,400		

Current Age	Beneficiaries			Total Pensioners		
	Count	Avg. Age	Avg. Mo. Benefit	Count	Avg. Age	Avg. Mo. Benefit
Under 30	9	26	790	9	26	790
30 - 34	9	33	705	9	33	705
35 - 39	22	37	816	28	37	915
40 - 44	32	42	843	56	42	968
45 - 49	32	47	1,028	110	47	1,253
50 - 54	117	52	883	279	52	1,123
55 - 59	247	57	988	1,695	58	1,854
60 - 64	408	62	938	4,369	62	1,614
65 - 69	570	67	889	6,699	67	1,411
70 - 74	619	72	836	5,086	72	1,281
75 - 79	629	77	723	3,610	77	1,040
80 - 84	609	82	663	2,509	82	876
85 - 89	501	87	615	1,634	87	722
90 - 94	264	91	502	777	92	609
95 & over	76	97	519	183	97	527
Total	4,144	74	768	27,053	71	1,272
Total Annual Benefits			38,208,000	412,899,492		

1. Summary of Valuation

Table 10
Distribution of Members Entitled to Deferred Benefits as of July 1, 2017

Current Age	Deferred Vested		
	Count	Avg. Age	Avg. Mo. Benefit
Under 30	44	28	335
30 - 34	235	32	416
35 - 39	408	37	500
40 - 44	527	42	636
45 - 49	776	47	711
50 - 54	834	52	758
55 - 59	778	57	691
60 - 64	551	61	539
65 - 69	127	66	447
70 - 74	20	71	568
75 - 79	1	77	118
80 - 84	-	-	-
85 - 89	-	-	-
90 - 94	-	-	-
95 & over	-	-	-
Total	4,301	50	637
Total Annual Benefits		32,852,760	

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 employees 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 and non-cash payments.

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 his credited service during the 15 years preceding the termination of his employment that produces the highest such average. If the member has less than 3 years of credited service (5 years for Tier 2), his final average salary is his average annual compensation during his 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 11.0% of members' compensation to the retirement system. Prior employer contribution rates are as follows:

- July 1, 2016 to July 1, 2017 12.0%
- July 1, 2015 to July 1, 2016 13.5%
- July 1, 2014 to July 1, 2015 14.0%
- July 1, 2013 to July 1, 2014 14.5%
- July 1, 2012 to July 1, 2013 14.0%
- July 1, 2011 to July 1, 2012 14.5%
- July 1, 2010 to July 1, 2011 12.5%
- July 1, 2009 to July 1, 2010 11.0%
- Prior to July 1, 2009 10.5%

2. Summary of System Provisions

Services 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 his employer's participation in the system, if later).

Contributing Service

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

Credited Service

Credited service is the sum of the member's prior service and his contributing service. Under certain circumstances, credited service may also be granted for periods of military service 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 his credited service. If the member subsequently reenters covered employment and remains employed for at least 1 year, then his forfeited credited service will be reinstated provided that he repays to the fund any member contributions (with interest) that he withdrew upon termination. Such repayment must commence no later than 2 years following his reemployment, and full repayment must be accomplished within 5 years following his reemployment.

Applied Unused Leave

A retiring member from Tier 1 may have his unused sick or annual leave applied as credited service to increase the amount of his 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 his credited service.

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 he dies before receiving pension payments that total the amount of his accumulated contributions (with interest) at the time of his retirement, then the difference will be paid to his beneficiary.

2. Summary of System Provisions

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 his 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 his 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.

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.

2. Summary of System Provisions

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 his 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 his 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 accumulated contributions, is entitled to a deferred vested benefit commencing at age 62.

Amount

The deferred vested pension is equal to 2% of the member's final average salary times his 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.

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 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 his 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 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 his estate as a death benefit.

Amount

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

2. Summary of System Provisions

The amount of a (non-designated beneficiary) surviving child's annuity is based upon the annuity reserve the member would have had if he had retired on his 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 his request receive a refund of his 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.

3. Actuarial Assumptions and Methods

Valuation Date

July 1, 2017

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. 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, 2009, to June 30, 2014. These assumptions will remain in effect for valuation purposes until such time as the Board adopts revised assumptions.

Interest Rate and Expenses

The valuation interest assumption is 7.50% 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:

- State 3.00% to 4.60% per year
- Nonstate 3.35% to 6.00% per year

Pre-Retirement Mortality

RP-2000 Non-Annuitant tables, projected with Scale AA on a fully generational basis.

Post-Retirement Mortality

The post-retirement mortality tables are as follows:

- Healthy males 110% of RP-2000 Healthy Annuitant table, projected with Scale AA on a fully generational basis
- Healthy females 101% of RP-2000 Healthy Annuitant table, projected with Scale AA on a fully generational basis
- Disabled males 96% of RP-2000 Disabled Annuitant table, projected with Scale AA on a fully generational basis
- Disabled females 107% of RP-2000 Disabled Annuitant table, projected with Scale AA on a fully generational basis

Withdrawal from Service

Withdrawal rates are shown in the Appendix. All withdrawal is assumed to result in 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.

3. Actuarial Assumptions and Methods

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	10.400%	7.000%
• Male – Nonstate	10.000%	7.500%
• Female – State	2.800%	0.300%
• Female – Nonstate	2.475%	0.275%

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.

Appendix – Detailed Assumptions

Salary Scales

Age	State	Nonstate	Age	State	Nonstate
19	4.600%	6.000%	40	3.600%	4.100%
20	4.600	6.000	41	3.575	4.075
21	4.550	5.770	42	3.550	4.050
22	4.500	5.540	43	3.525	4.025
23	4.450	5.310	44	3.500	4.000
24	4.400	5.080	45	3.475	3.975
25	4.350	4.850	46	3.400	3.950
26	4.300	4.800	47	3.325	3.925
27	4.250	4.750	48	3.250	3.900
28	4.200	4.700	49	3.175	3.875
29	4.150	4.650	50	3.100	3.850
30	4.100	4.600	51	3.100	3.800
31	4.050	4.550	52	3.100	3.750
32	4.000	4.500	53	3.100	3.700
33	3.950	4.450	54	3.100	3.650
34	3.900	4.400	55	3.100	3.600
35	3.850	4.350	56	3.050	3.550
36	3.800	4.300	57	3.000	3.500
37	3.750	4.250	58	3.000	3.450
38	3.700	4.200	59	3.000	3.400
39	3.650	4.150	60+	3.000	3.350

Appendix – Detailed Assumptions

Withdrawal Rates for State (less than 1 year)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.26000	0.26000	33	0.25513	0.23621	47	0.18018	0.18018
20	0.35100	0.32500	34	0.25025	0.23023	48	0.17732	0.17732
21	0.34398	0.31850	35	0.23712	0.22425	49	0.17446	0.17446
22	0.33872	0.31200	36	0.23088	0.22126	50	0.16380	0.17160
23	0.33345	0.30550	37	0.22776	0.21827	51	0.16107	0.16874
24	0.32819	0.29900	38	0.22464	0.21528	52	0.15834	0.16588
25	0.30927	0.26910	39	0.22152	0.21229	53	0.15561	0.16302
26	0.30420	0.26611	40	0.20930	0.20020	54	0.15288	0.16016
27	0.29913	0.26312	41	0.20631	0.19734	55	0.15015	0.14300
28	0.29406	0.26013	42	0.20332	0.19448	56	0.15015	0.14300
29	0.28730	0.25714	43	0.20033	0.19162	57	0.15015	0.14300
30	0.26975	0.25415	44	0.19734	0.18876	58	0.15015	0.14300
31	0.26488	0.24817	45	0.18590	0.18590	59	0.15015	0.14300
32	0.26000	0.24219	46	0.18304	0.18304	60	0.15015	0.14300

Withdrawal Rates for State (1 to 2 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.26250	0.22500	33	0.21000	0.20350	47	0.15400	0.13250
20	0.29400	0.27000	34	0.20300	0.19800	48	0.15400	0.13000
21	0.28840	0.26700	35	0.19600	0.19250	49	0.15400	0.12750
22	0.28280	0.26400	36	0.19040	0.18700	50	0.12375	0.12500
23	0.27720	0.26100	37	0.18480	0.18150	51	0.12150	0.12250
24	0.27160	0.25800	38	0.17920	0.17600	52	0.11925	0.12000
25	0.26600	0.23375	39	0.17360	0.17050	53	0.11700	0.11750
26	0.25900	0.23100	40	0.16800	0.15000	54	0.11475	0.11500
27	0.25200	0.22825	41	0.16520	0.14750	55	0.11250	0.11250
28	0.24500	0.22550	42	0.16240	0.14500	56	0.11250	0.11250
29	0.23800	0.22275	43	0.15960	0.14250	57	0.11250	0.11250
30	0.23100	0.22000	44	0.15680	0.14000	58	0.11250	0.11250
31	0.22400	0.21450	45	0.15400	0.13750	59	0.11250	0.11250
32	0.21700	0.20900	46	0.15400	0.13500	60	0.11250	0.11250

Appendix – Detailed Assumptions

Withdrawal Rates for State (2 to 3 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.24700	0.20000	33	0.16640	0.16000	47	0.09460	0.10750
20	0.24700	0.20000	34	0.16120	0.15500	48	0.09240	0.10500
21	0.24180	0.19750	35	0.15600	0.15000	49	0.09020	0.10250
22	0.23660	0.19500	36	0.15080	0.14500	50	0.08800	0.12500
23	0.23140	0.19250	37	0.14560	0.14000	51	0.08580	0.12188
24	0.22620	0.19000	38	0.14040	0.13500	52	0.08360	0.11875
25	0.22100	0.18750	39	0.13520	0.13000	53	0.08140	0.11563
26	0.21320	0.18500	40	0.13000	0.12500	54	0.07920	0.11250
27	0.20540	0.18250	41	0.12740	0.12250	55	0.07700	0.10938
28	0.19760	0.18000	42	0.12480	0.12000	56	0.07480	0.10625
29	0.18980	0.17750	43	0.12220	0.11750	57	0.07260	0.10313
30	0.18200	0.17500	44	0.11960	0.11500	58	0.07040	0.10000
31	0.17680	0.17000	45	0.09900	0.11250	59	0.06820	0.09688
32	0.17160	0.16500	46	0.09680	0.11000	60	0.06600	0.09375

Withdrawal Rates for State (3 to 4 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.20800	0.16800	33	0.14040	0.13608	47	0.08580	0.09198
20	0.20800	0.17640	34	0.13520	0.13104	48	0.08320	0.09072
21	0.20280	0.17388	35	0.13000	0.12600	49	0.08060	0.08946
22	0.19760	0.17136	36	0.12480	0.12096	50	0.07800	0.08820
23	0.19240	0.16884	37	0.11960	0.11592	51	0.07540	0.08568
24	0.18720	0.16632	38	0.11440	0.11088	52	0.07280	0.08316
25	0.18200	0.16380	39	0.10920	0.10584	53	0.07020	0.08064
26	0.17680	0.16128	40	0.10400	0.10080	54	0.06760	0.07812
27	0.17160	0.15876	41	0.10140	0.09954	55	0.06500	0.07560
28	0.16640	0.15624	42	0.09880	0.09828	56	0.06240	0.07308
29	0.16120	0.15372	43	0.09620	0.09702	57	0.05980	0.07056
30	0.15600	0.15120	44	0.09360	0.09576	58	0.05720	0.06804
31	0.15080	0.14616	45	0.09100	0.09450	59	0.05460	0.06552
32	0.14560	0.14112	46	0.08840	0.09324	60	0.05200	0.06300

Appendix – Detailed Assumptions

Withdrawal Rates for State (4 to 5 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.18200	0.13500	33	0.11088	0.10500	47	0.08050	0.07375
20	0.18200	0.13500	34	0.10584	0.10250	48	0.07700	0.07313
21	0.17640	0.13365	35	0.10080	0.10000	49	0.07350	0.07250
22	0.17080	0.13230	36	0.09576	0.09750	50	0.07000	0.07188
23	0.16520	0.13095	37	0.09072	0.09500	51	0.06650	0.07063
24	0.15960	0.12960	38	0.08568	0.09250	52	0.06300	0.06938
25	0.13860	0.12825	39	0.08064	0.09000	53	0.05950	0.06813
26	0.13608	0.12690	40	0.10500	0.08750	54	0.05600	0.06688
27	0.13356	0.12555	41	0.10150	0.08500	55	0.05250	0.06563
28	0.13104	0.12420	42	0.09800	0.08250	56	0.04900	0.06250
29	0.12852	0.12285	43	0.09450	0.08000	57	0.04550	0.05938
30	0.12600	0.11250	44	0.09100	0.07750	58	0.04200	0.05625
31	0.12096	0.11000	45	0.08750	0.07500	59	0.03850	0.05313
32	0.11592	0.10750	46	0.08400	0.07438	60	0.03500	0.05000

Withdrawal Rates for State (greater than 5 years)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.12000	0.12100	33	0.07320	0.07150	47	0.03120	0.03800
20	0.14400	0.12100	34	0.06960	0.06600	48	0.02880	0.03700
21	0.13824	0.11880	35	0.06600	0.05500	49	0.02640	0.03600
22	0.13248	0.11660	36	0.06240	0.05300	50	0.03120	0.03500
23	0.12672	0.11440	37	0.05880	0.05100	51	0.02808	0.03200
24	0.12096	0.11220	38	0.05520	0.04900	52	0.02496	0.02900
25	0.11520	0.11000	39	0.05160	0.04700	53	0.02184	0.02600
26	0.11232	0.10560	40	0.04800	0.04500	54	0.01872	0.02300
27	0.10944	0.10120	41	0.04560	0.04400	55	0.02400	0.03500
28	0.10656	0.09680	42	0.04320	0.04300	56	0.02400	0.03150
29	0.10368	0.09240	43	0.04080	0.04200	57	0.02400	0.02800
30	0.08400	0.08800	44	0.03840	0.04100	58	0.02400	0.02450
31	0.08040	0.08250	45	0.03600	0.04000	59	0.02400	0.02100
32	0.07680	0.07700	46	0.03360	0.03900	60	0.02400	0.01750

Appendix – Detailed Assumptions

Withdrawal Rates for Nonstate (less than 1 year)

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.31200	0.28750	33	0.28704	0.24035	47	0.20976	0.19320
20	0.35880	0.28750	34	0.28152	0.23575	48	0.20424	0.18630
21	0.35328	0.28405	35	0.27600	0.23000	49	0.19872	0.17940
22	0.34776	0.28060	36	0.27048	0.22770	50	0.19320	0.17250
23	0.34224	0.27715	37	0.26496	0.22540	51	0.18768	0.16790
24	0.33672	0.27370	38	0.25944	0.22310	52	0.18216	0.16330
25	0.33120	0.26910	39	0.25392	0.22080	53	0.17664	0.15870
26	0.32568	0.26565	40	0.24840	0.21850	54	0.17112	0.15410
27	0.32016	0.26220	41	0.24288	0.21620	55	0.16560	0.14950
28	0.31464	0.25875	42	0.23736	0.21390	56	0.16008	0.14720
29	0.30912	0.25530	43	0.23184	0.21160	57	0.15456	0.14490
30	0.30360	0.25070	44	0.22632	0.20930	58	0.15180	0.14260
31	0.29808	0.24725	45	0.22080	0.20700	59	0.15180	0.14030
32	0.29256	0.24380	46	0.21528	0.20010	60	0.15180	0.13800

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	0.25000	0.20900	33	0.15620	0.17138	47	0.09900	0.11780
20	0.25000	0.19855	34	0.14960	0.16929	48	0.09600	0.11495
21	0.24625	0.19646	35	0.14300	0.16720	49	0.09300	0.11210
22	0.24250	0.19437	36	0.13970	0.16302	50	0.09000	0.10925
23	0.23875	0.19228	37	0.13640	0.15884	51	0.08900	0.10735
24	0.23500	0.19019	38	0.13310	0.15466	52	0.08800	0.10545
25	0.23125	0.18810	39	0.12980	0.15048	53	0.08700	0.10355
26	0.22500	0.18601	40	0.12650	0.13300	54	0.08600	0.10165
27	0.21875	0.18392	41	0.12430	0.13110	55	0.08500	0.09975
28	0.21250	0.18183	42	0.12210	0.12920	56	0.08400	0.09785
29	0.20625	0.17974	43	0.11990	0.12730	57	0.08300	0.09595
30	0.17600	0.17765	44	0.11770	0.12540	58	0.08200	0.09405
31	0.16940	0.17556	45	0.10500	0.12350	59	0.08100	0.09215
32	0.16280	0.17347	46	0.10200	0.12065	60	0.08000	0.09025

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	0.16500	0.16000	33	0.08019	0.07920	47	0.04140	0.03960
20	0.14850	0.14400	34	0.07722	0.07560	48	0.03960	0.03690
21	0.14256	0.13860	35	0.06750	0.07200	49	0.03780	0.03420
22	0.13662	0.13320	36	0.06480	0.06930	50	0.04000	0.03500
23	0.13068	0.12780	37	0.06210	0.06660	51	0.03800	0.03300
24	0.12474	0.12240	38	0.05940	0.06390	52	0.03600	0.03100
25	0.11880	0.11700	39	0.05670	0.06120	53	0.03400	0.02900
26	0.11286	0.11160	40	0.05400	0.05850	54	0.03200	0.02700
27	0.10692	0.10620	41	0.05220	0.05580	55	0.03000	0.02500
28	0.10098	0.10080	42	0.05040	0.05310	56	0.02800	0.02400
29	0.09504	0.09540	43	0.04860	0.05040	57	0.02600	0.02300
30	0.08910	0.09000	44	0.04680	0.04770	58	0.02400	0.02200
31	0.08613	0.08640	45	0.04500	0.04500	59	0.02200	0.02100
32	0.08316	0.08280	46	0.04320	0.04230	60	0.02000	0.02000

Appendix – Detailed Assumptions

Disability Rates for State and Nonstate

Age	Male	Female	Age	Male	Female	Age	Male	Female
19	0.00000	0.00000	33	0.00035	0.00045	47	0.00318	0.00180
20	0.00007	0.00005	34	0.00038	0.00047	48	0.00358	0.00195
21	0.00008	0.00009	35	0.00041	0.00049	49	0.00399	0.00210
22	0.00010	0.00013	36	0.00053	0.00054	50	0.00439	0.00225
23	0.00011	0.00017	37	0.00065	0.00059	51	0.00473	0.00285
24	0.00013	0.00021	38	0.00077	0.00064	52	0.00507	0.00345
25	0.00014	0.00025	39	0.00089	0.00068	53	0.00540	0.00405
26	0.00016	0.00027	40	0.00102	0.00073	54	0.00574	0.00465
27	0.00019	0.00031	41	0.00129	0.00078	55	0.00608	0.00341
28	0.00022	0.00033	42	0.00156	0.00083	56	0.00621	0.00366
29	0.00024	0.00036	43	0.00183	0.00088	57	0.00635	0.00390
30	0.00027	0.00039	44	0.00210	0.00093	58	0.00648	0.00415
31	0.00030	0.00041	45	0.00237	0.00150	59	0.00662	0.00439
32	0.00032	0.00043	46	0.00277	0.00165	60	0.00675	0.00488

Retirement Rates for State and Nonstate

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