

West Virginia Public Employees' Retirement System

Actuarial Valuation as of July 1, 2019

March 2020



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

March 25, 2020

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, 2019. This valuation presents the annual cost and related liabilities of the System as of the valuation date.

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

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 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, 2019, 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.

The valuation results incorporate an estimate of the impact of HB 3095, which set a minimum monthly benefit of \$750 for pensioners in receipt of benefits as of June 3, 2019 who had completed at least 25 years of service. Likewise, the minimum monthly benefit was set to \$375 for beneficiaries in pay status as of June 3, 2019, where the original member had completed at least 25 years of service, elected the 50% joint-and-survivor option at retirement, and subsequently passed away. The additional liability resulting from the enactment of HB 3095 was estimated by the Board Actuary and provided to us. We did not independently verify or review this estimate. The accuracy of the results presented in this valuation is dependent upon the accuracy of this estimate. The additional liability associated with HB 3095 is approximately 0.03% of the total, so any reasonable adjustment to the results necessitated by a change in this estimate would not be expected to materially affect the results of the valuation or the relationship to the actuarially determined cost in comparison with the expected contributions.

This report presents fairly the actuarial position of the West Virginia Public Employees' Retirement System as of July 1, 2019, 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. The mortality assumptions were developed in accordance with the recommendation that an appropriate margin for future improvement in mortality beyond the measurement date be included.

Future actuarial measurements may differ significantly from current measurements due to system experience differing from that anticipated by the economic and demographic assumptions, changes expected as part of the natural operation of the methodology used for these measurements, and changes in system provisions, or applicable law or regulations. An analysis of the potential range of such future differences is beyond the scope of this valuation.

Where presented, the "funded 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.


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.

A new Actuarial Standard of Practice, ASOP 51, applies to funding valuations made on or after November 1, 2018. ASOP 51 requires certain disclosures of potential risks to the system and provides useful information for intended users of actuarial reports who determine plan contributions or evaluate the adequacy of specified contribution levels to support benefit provisions. The disclosures required under ASOP 51 will be developed by the Board Actuary and reported separately.

Use of this report for any other purpose may not be appropriate and may result in mistaken conclusions due to failure to understand applicable assumptions, methodologies, or inapplicability of the report for that purpose. Because of the risk of misinterpretation of actuarial results, Buck recommends requesting its advance review of any statement, document, or filing to be based on information contained in this report. Buck will accept no liability for any such statement, document, or filing made without its prior review.

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, 2019, 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, 2018, 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 16-year period (30 years from July 1, 2005) and the amount required to amortize the liability for benefit improvements to annuitants under HB 3095 (described below) over a six-year period beginning July 1, 2019.

Comments on Valuation Results

Table 1 presents the development of the valuation results as of July 1, 2019, and, for comparison purposes, July 1, 2018. 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.

Effective July 1, 2019, the valuation assumptions for mortality, withdrawal rates, disability rates, retirement rates, salary scales, and non-contributory service loads were changed to reflect the most recent experience study. These assumption changes decreased the unfunded liability by approximately \$47.0 million.

The actual unfunded liability of approximately \$445.1 million differed from the expected amount of approximately \$445.0 million, primarily due to the following reasons:

- HB 3095, which set a minimum monthly benefit of \$750 for retirees (\$375 for 50% joint-and-survivor beneficiaries of eligible retirees) in pay status as of June 3, 2019, if the retiree had completed at least 25 years of service, was enacted. The Board Actuary estimated that HB 3095 increased the unfunded liability as of July 1, 2019, by approximately \$2.5 million.
- The demographic experience resulted in a net liability loss of approximately \$79.6 million. This loss was primarily the result of the pay increase experience and turnover experience, which were partially offset by favorable retirement and mortality experience, as well as lower benefit payments than expected.

1. Summary of Valuation

- The assumption changes effective July 1, 2019, as noted above, resulted in a liability decrease in the accrued liability of approximately \$47.0 million.
- The return on the actuarial value of assets for the year ending June 30, 2019, was approximately 8.05%, which was higher than the assumed return of 7.50%. This resulted in an asset gain of approximately \$35.0 million.

Table 2a presents a projection of the primary unfunded actuarial accrued liability to June 30, 2035. The primary unfunded actuarial accrued liability at the valuation date is approximately \$442.6 million. This table illustrates the expected pattern of change in the primary unfunded liability over the remaining 16-year period. Table 2b presents a projection of the unfunded liability for benefit improvements to annuitants attributable to HB 3095 to June 30, 2025. This unfunded actuarial accrued liability at the valuation date is approximately \$2.5 million. This table illustrates the expected pattern of change in this unfunded liability over the remaining 6-year period.

Table 3 presents a cash flow projection of expected asset balances, contributions, benefit payments, and earnings over the period to FY 2044. 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 4a presents the market value and actuarial value of assets for the fiscal year ending June 30, 2019 and, for comparison purposes, the fiscal year ending June 30, 2018. 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, 2019.

System Membership

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

Group	July 1, 2019	July 1, 2018
Actives	35,508	34,765
Retirees and Beneficiaries	28,033	27,568
Terminated Vested	4,747	4,626
Terminated Non-Vested	<u>20,078</u>	<u>19,474</u>
Total	88,366	86,433

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 eligibility service groupings as of July 1, 2019.

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, 2019	July 1, 2018
Membership:		
• Active	35,508	34,765
• Inactive	52,858	51,668
• Total	<u>88,366</u>	<u>86,433</u>
1. Present Value of Future Benefits		
a. Active	\$ 3,856,945	\$ 3,733,117
b. Inactive:		
• Retirees	3,493,452	3,395,002
• Disabled Retirees	214,652	223,261
• Beneficiaries	313,010	317,745
• Vested Terminated	209,482	187,610
• Non-Vested Terminated	19,498	18,312
c. Total	<u>\$ 8,107,039</u>	<u>\$ 7,875,047</u>
2. Actuarial Accrued Liability	\$ 7,237,396	\$ 7,003,602
3. Assets at Actuarial Value	\$ 6,792,291	\$ 6,508,771
4. Unfunded Actuarial Accrued Liability (2) - (3)	\$ 445,105	\$ 494,831
a. Primary Unfunded	\$ 442,605	\$ 494,831
b. Improvements for annuitants per HB 3095	\$ 2,500	\$ 0
5. Annual Normal Cost Rate (Tier 1)		
a. Present Value of Future Normal Cost	\$ 677,215	\$ 728,700
b. Present Value of Future Payroll	\$ 7,524,406	\$ 7,802,341
c. Normal Cost Rate as a % of Payroll (5a) / (5b)	9.00%	9.34%
d. Employee Contribution Rate	4.50%	4.50%
e. Employer Share of Normal Cost	4.50%	4.84%
f. Valuation Compensation FY 2020 (2019)	\$ 1,162,963	\$ 1,160,230
6. Annual Normal Cost Rate (Tier 2)		
a. Present Value of Future Normal Cost	\$ 192,428	\$ 142,745
b. Present Value of Future Payroll	\$ 2,282,639	\$ 1,597,019
c. Normal Cost Rate as a % of Payroll (6a) / (6b)	8.43%	8.94%
d. Employee Contribution Rate	6.00%	6.00%
e. Employer Share of Normal Cost	2.43%	2.94%
f. Valuation Compensation FY 2020 (2019)	\$ 334,673	\$ 228,432
7. Calculated Employer Cost FY 2020 (2019)		
a. Amortization Payment on UAAL MOY ¹	\$ 46,698	\$ 50,589
b. Amortization Payment on HB 3095 MOY ²	514	0
c. Employer Normal Cost MOY	62,692	65,186
d. Total Employer Cost MOY	<u>\$ 109,904</u>	<u>\$ 115,775</u>
e. Employer Cost as Percentage of Compensation	7.34%	8.34%
8. Expected Employer Contributions FY 2020 (2019)		
a. Employer Contribution Rate	10.00%	10.00%
b. Employer Contribution	\$ 149,764	\$ 138,866

¹ FY 2020 amortization payment is over 16 years (30 years from July 1, 2005).

² FY 2020 amortization payment is over 6 years (6 years from July 1, 2019).

1. Summary of Valuation

Table 2a
Projection of Unfunded Accrued 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
2020	\$ 442,605	\$ 1,497,636	3.12%	\$ 46,698
2021	427,383	1,557,541	3.00%	46,698
2022	411,019	1,619,843	2.88%	46,698
2023	393,428	1,684,637	2.77%	46,698
2024	374,518	1,752,022	2.67%	46,698
2025	354,189	1,822,103	2.56%	46,698
2026	332,335	1,894,987	2.46%	46,698
2027	308,843	1,970,787	2.37%	46,698
2028	283,589	2,049,618	2.28%	46,698
2029	256,441	2,131,603	2.19%	46,698
2030	227,256	2,216,867	2.11%	46,698
2031	195,883	2,305,542	2.03%	46,698
2032	162,156	2,397,763	1.95%	46,698
2033	125,901	2,493,674	1.87%	46,698
2034	86,926	2,593,421	1.80%	46,698
2035	45,028	2,697,158	1.73%	46,698

Table 2a
Projection of Unfunded Accrued 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
2020	\$ 2,500	\$ 1,497,636	0.03%	\$ 514
2021	2,155	1,557,541	0.03%	514
2022	1,783	1,619,843	0.03%	514
2023	1,384	1,684,637	0.03%	514
2024	955	1,752,022	0.03%	514
2025	494	1,822,103	0.03%	514

1. Summary of Valuation

Table 3
Cash Flow Projection FY 2020 through FY 2044 (000's omitted)

FY Ending 6/30	Assets Beg. of Year	Expected Contributions	Benefits	Earnings	Net Income	Assets End of Year
2020	\$ 6,925,454	\$ 222,177	\$ 494,395	\$ 509,385	\$ 237,167	\$ 7,162,621
2021	7,162,621	231,064	493,093	527,548	265,519	7,428,140
2022	7,428,140	240,307	510,297	547,169	277,179	7,705,319
2023	7,705,319	249,919	528,146	567,654	289,427	7,994,746
2024	7,994,746	259,916	546,616	589,049	302,349	8,297,095
2025	8,297,095	270,313	565,252	611,422	316,483	8,613,578
2026	8,613,578	281,126	583,051	634,901	332,976	8,946,554
2027	8,946,554	292,371	600,518	659,645	351,498	9,298,052
2028	9,298,052	304,066	617,518	685,812	372,360	9,670,412
2029	9,670,412	316,229	633,382	713,603	396,450	10,066,862
2030	10,066,862	328,878	648,675	743,239	423,442	10,490,304
2031	10,490,304	342,033	662,916	774,957	454,074	10,944,378
2032	10,944,378	355,714	676,533	809,015	488,196	11,432,574
2033	11,432,574	369,943	688,287	845,721	527,377	11,959,951
2034	11,959,951	384,741	698,803	885,432	571,370	12,531,321
2035	12,531,321	400,131	707,745	928,522	620,908	13,152,229
2036	13,152,229	416,136	714,831	975,419	676,724	13,828,953
2037	13,828,953	432,781	720,378	1,026,582	738,985	14,567,938
2038	14,567,938	450,092	724,094	1,082,506	808,504	15,376,442
2039	15,376,442	468,096	725,947	1,143,739	885,888	16,262,330
2040	16,262,330	486,820	725,916	1,210,871	971,775	17,234,105
2041	17,234,105	506,293	724,437	1,284,525	1,066,381	18,300,486
2042	18,300,486	526,545	720,458	1,365,396	1,171,483	19,471,969
2043	19,471,969	547,607	714,604	1,454,249	1,287,252	20,759,221
2044	20,759,221	569,511	706,623	1,551,893	1,414,781	22,174,002

Notes:

1. Earnings are based on an assumed asset return of 7.50%.
2. The fund balance as of July 1, 2019 is the market value of the fund.
3. The contribution for FY 2020 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 10.0% times the anticipated FY 2020 base pay. Thereafter, the contribution is assumed to increase at 4.00% 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, 2019 (000's omitted)

	June 30, 2019	June 30, 2018
Assets		
• Cash with State Treasurer	\$ 61	\$ 415
• Investments at Fair Value	6,895,386	6,718,698
• Contributions Receivable	5,157	5,558
• Other Receivables	25,050	45,023
• Total Assets	<u>\$ 6,925,654</u>	<u>\$ 6,769,694</u>
Liabilities		
• Accrued Expenses and Other Payables	<u>200</u>	<u>140</u>
Market Value of Assets	\$ 6,925,454	\$ 6,769,554
Adjustments for Actuarial Value of Assets		
• Smoothing of Deferred Gains / (Losses)	\$ 108,163	\$ 215,783
• DHSS Settlement Accrual	25,000	45,000
• Total Adjustments	<u>\$ 133,163</u>	<u>\$ 260,783</u>
Actuarial Value of Assets	\$ 6,792,291	\$ 6,508,771

Table 4b
Four-Year Asset Smoothing as of June 30, 2019 (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
2019	\$ (93,383)	75%	\$ (70,037)	\$ (23,346)
2018	138,794	50%	69,397	34,699
2017	435,213	25%	108,803	108,803
2016	(423,678)	0%	0	(105,920)
Total			<u>\$ 108,163</u>	<u>\$ 14,236</u>

1. Summary of Valuation

Table 5

Changes in Market Value of Assets for Year Ended June 30, 2019 (000's omitted)

	Amount
Market Value of Assets - Beginning of Year	\$ 6,769,554
Prior Period Adjustment	-
Market Value of Assets - Beginning of Year Restated	<u>\$ 6,769,554</u>
Additions:	
• Contributions:	
○ Member - Tier 1	52,548
○ Member - Tier 2	17,809
○ Employer - Tier 1	117,271
○ Employer - Tier 2	29,760
○ Reinstatements	-
○ Special Appropriation	-
○ Subtotal	<u>\$ 217,388</u>
• Investment Income:	
○ Net Appreciation ¹ and Interest	393,179
○ Other Return in Investments	-
○ Subtotal	<u>\$ 393,179</u>
• Other Income	<u>763</u>
• Total	<u>\$ 611,330</u>
Deductions and Transfers:	
• Benefit Expense	436,965
• Refunds of Contributions	11,782
• Administrative Expenses	6,915
• Transfers to / (from) Other Systems	<u>(232)</u>
• Total	<u>\$ 455,430</u>
Net Increase	155,900
Market Value of Assets - End of Year	\$ 6,925,454
Investment Return for Year on Market Value:	
• Valuation Purposes (assumes mid-year transactions and offsets investment income by investment and administrative expense)	5.80%
• Per Investment Management Board (time-weighted, excluding administrative expense)	6.00%

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, 2018	34,765	19,474	4,626	21,149	2,253	4,166	86,433
• New Entrants	3,988	721	-	-	-	-	4,709
• Returned to Active Status	591	(403)	(167)	(21)	-	-	-
• Terminated Non-Vested	(1,226)	1,229	(3)	-	-	-	-
• Terminated Vested	(690)	(4)	694	-	-	-	-
• Withdrew Contributions	(741)	(784)	(173)	-	-	-	(1,698)
• Transferred out	-	(2)	-	-	-	-	(2)
• Retired	(1,068)	(9)	(185)	1,262	-	-	-
• Disabled	(45)	-	(13)	-	58	-	-
• Deceased	(62)	(115)	(22)	(719)	(99)	(261)	(1,278)
• New Beneficiaries	-	-	-	-	-	247	247
• New QDRO's	-	-	-	-	-	20	20
• Adjustments	(4)	(29)	(10)	(18)	-	(4)	(65)
Census as of July 1, 2019	35,508	20,078	4,747	21,653	2,212	4,168	88,366

1. Summary of Valuation

Table 7
Summary of Membership and Payroll

	July 1, 2019	July 1, 2018
Active Members		
• State Employees	22,988	22,419
• Nonstate Employees	<u>12,520</u>	<u>12,346</u>
• Total	35,508	34,765
• Tier 1 Employees	25,448	27,284
• Tier 2 Employees	<u>10,060</u>	<u>7,481</u>
• Total	35,508	34,765
• Average Age	46.93	47.09
• Average Service	10.62	10.84
Inactive Members		
• Service Retirees	21,653	21,149
• Disabled Retirees	2,212	2,253
• Beneficiaries	4,168	4,166
• Vested Terminated	4,747	4,626
• Non-Vested Terminated	<u>20,078</u>	<u>19,474</u>
• Total	52,858	51,668
Payroll for Normal Cost		
• State Employees	\$ 1,000,008,000	\$ 905,665,000
• Nonstate Employees	<u>497,628,000</u>	<u>482,997,000</u>
• Total	\$ 1,497,636,000	\$ 1,388,662,000
• Tier 1 Employees	\$ 1,162,963,000	\$ 1,160,230,000
• Tier 2 Employees	<u>334,673,000</u>	<u>228,432,000</u>
• Total	\$ 1,497,636,000	\$ 1,388,662,000
PV of Future Payroll	\$ 9,807,045,000	\$ 9,399,360,000
PV of Member Contributions	\$ 475,556,000	\$ 446,926,000

1. Summary of Valuation

Table 8a
Distribution of Active Members as of July 1, 2019 - 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	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	Count / Total Comp		
Under 25	1,022 / 32,911,916	5 / 239,113	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	1,027 / 33,151,029
25 - 29	1,356 / 47,458,628	237 / 10,087,470	6 / 227,220	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	1,599 / 57,773,318
30 - 34	1,025 / 36,202,252	682 / 29,560,613	172 / 8,028,985	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	1,879 / 73,791,850
35 - 39	957 / 34,039,564	659 / 27,898,283	508 / 23,896,707	117 / 5,647,466	2 / 69,833	- / -	- / -	- / -	- / -	- / -	- / -	- / -	2,243 / 91,551,853
40 - 44	952 / 33,542,531	641 / 28,221,804	490 / 23,431,049	476 / 24,901,575	150 / 7,612,948	5 / 229,804	- / -	- / -	- / -	- / -	- / -	- / -	2,714 / 117,939,711
45 - 49	945 / 34,136,911	655 / 28,299,502	527 / 24,314,446	536 / 26,491,687	577 / 32,871,950	156 / 9,088,357	7 / 334,118	- / -	- / -	- / -	- / -	- / -	3,403 / 155,536,971
50 - 54	863 / 30,559,140	635 / 27,223,484	493 / 22,526,435	458 / 22,054,796	455 / 24,665,391	386 / 22,677,578	154 / 8,529,936	12 / 700,861	- / -	- / -	- / -	- / -	3,456 / 158,937,621
55 - 59	685 / 24,590,371	634 / 26,699,214	487 / 21,694,466	513 / 24,474,997	401 / 20,650,037	266 / 15,508,326	204 / 12,009,461	104 / 6,057,260	12 / 594,533	- / -	- / -	- / -	3,306 / 152,278,665
60 - 64	401 / 15,702,887	414 / 17,024,242	393 / 17,755,816	353 / 16,903,543	270 / 13,537,587	156 / 8,596,195	128 / 7,498,963	83 / 5,048,628	81 / 4,243,762	- / -	- / -	- / -	2,279 / 106,311,623
65 - 69	125 / 5,227,163	127 / 5,718,252	145 / 6,401,729	118 / 5,637,585	80 / 3,989,200	58 / 3,273,336	47 / 2,813,368	40 / 2,173,714	48 / 3,026,148	- / -	- / -	- / -	788 / 38,260,495
70 & up	41 / 1,834,692	45 / 2,116,750	57 / 2,715,004	51 / 2,137,892	30 / 1,487,434	23 / 1,362,359	10 / 651,225	7 / 387,123	30 / 1,782,168	- / -	- / -	- / -	294 / 14,474,647
Total	8,372 / 296,206,055	4,734 / 203,088,727	3,278 / 150,991,857	2,622 / 128,249,541	1,965 / 104,884,380	1,050 / 60,735,955	550 / 31,837,071	246 / 14,367,586	171 / 9,646,611	- / -	- / -	- / -	22,988 / 1,000,007,783

1. Summary of Valuation

**Table 8b
Distribution of Active Members as of July 1, 2019 - 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	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	Count / Total Comp		
Under 25	636 / 17,406,076	10 / 376,162	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	646 / 17,782,238
25 - 29	753 / 24,316,371	188 / 7,201,954	6 / 264,978	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	947 / 31,783,303
30 - 34	626 / 21,226,895	314 / 13,173,114	103 / 4,455,649	2 / 114,224	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -	1,045 / 38,969,882
35 - 39	547 / 18,435,609	314 / 12,966,076	248 / 11,640,185	71 / 3,448,841	3 / 118,204	- / -	- / -	- / -	- / -	- / -	- / -	- / -	1,183 / 46,608,915
40 - 44	523 / 17,207,468	315 / 12,300,470	265 / 12,725,349	176 / 8,597,513	81 / 4,141,482	4 / 184,615	- / -	- / -	- / -	- / -	- / -	- / -	1,364 / 55,156,897
45 - 49	572 / 18,964,184	353 / 13,931,531	252 / 10,717,499	217 / 10,469,046	176 / 9,065,854	90 / 4,803,771	4 / 212,188	- / -	- / -	- / -	- / -	- / -	1,664 / 68,164,073
50 - 54	517 / 17,868,057	346 / 13,836,118	282 / 11,684,979	236 / 11,018,968	216 / 10,947,843	160 / 8,115,944	83 / 4,287,197	3 / 131,043	- / -	- / -	- / -	- / -	1,843 / 77,890,149
55 - 59	429 / 14,207,839	339 / 13,062,714	295 / 12,081,196	257 / 11,211,606	175 / 8,453,503	127 / 6,064,848	93 / 5,343,475	44 / 2,400,952	6 / 383,112	- / -	- / -	- / -	1,765 / 73,209,245
60 - 64	285 / 9,916,559	225 / 8,612,593	235 / 9,885,432	181 / 8,308,887	139 / 6,385,282	104 / 5,448,282	67 / 3,630,678	47 / 2,509,188	34 / 1,880,072	- / -	- / -	- / -	1,317 / 56,576,973
65 - 69	108 / 4,127,911	82 / 3,181,693	83 / 2,922,972	63 / 2,915,622	52 / 2,334,075	41 / 1,841,655	30 / 1,512,627	22 / 1,210,751	16 / 1,068,142	- / -	- / -	- / -	497 / 21,115,448
70 & up	41 / 1,648,420	46 / 1,561,362	41 / 1,583,779	36 / 1,403,944	26 / 1,275,336	25 / 999,520	15 / 723,251	5 / 217,987	14 / 957,451	- / -	- / -	- / -	249 / 10,371,050
Total	5,037 / 165,325,389	2,532 / 100,203,787	1,810 / 77,962,018	1,239 / 57,488,651	868 / 42,721,579	551 / 27,458,635	292 / 15,709,416	121 / 6,469,921	70 / 4,288,777	- / -	- / -	- / -	12,520 / 497,628,173

1. Summary of Valuation

Table 9
Distribution of Retired Members as of July 1, 2019

Current Age	Service Retirees			Disabled Retirees		
	Count	Avg. Age	Avg. Mo. Benefit	Count	Avg. Age	Avg. Mo. Benefit
Under 30	-	-	-	-	-	-
30 - 34	-	-	-	-	-	-
35 - 39	-	-	-	4	38	1,447
40 - 44	-	-	-	13	43	1,093
45 - 49	-	-	-	71	47	1,378
50 - 54	2	54	986	157	52	1,423
55 - 59	942	58	2,330	316	57	1,355
60 - 64	3,314	62	1,790	477	62	1,265
65 - 69	5,651	67	1,553	497	67	820
70 - 74	4,984	72	1,463	380	72	716
75 - 79	3,033	77	1,239	176	77	604
80 - 84	2,007	82	1,039	76	82	468
85 - 89	1,081	87	852	24	87	351
90 - 94	508	92	718	19	92	459
95 & over	131	97	640	2	96	247
Total	21,653	72	1,451	2,212	65	1,000
Total Annual Benefits		376,905,792				26,545,260

Current Age	Beneficiaries			Total Pensioners		
	Count	Avg. Age	Avg. Mo. Benefit	Count	Avg. Age	Avg. Mo. Benefit
Under 30	9	27	815	9	27	815
30 - 34	8	33	1,168	8	33	1,168
35 - 39	19	37	754	23	37	875
40 - 44	28	42	1,024	41	42	1,046
45 - 49	46	47	908	117	47	1,193
50 - 54	97	53	847	256	52	1,201
55 - 59	218	57	943	1,476	58	1,916
60 - 64	391	62	981	4,182	62	1,654
65 - 69	580	67	938	6,728	67	1,446
70 - 74	663	72	860	6,027	72	1,350
75 - 79	703	77	814	3,912	77	1,134
80 - 84	599	82	704	2,682	82	948
85 - 89	451	87	643	1,556	87	784
90 - 94	277	92	566	804	92	660
95 & over	79	97	588	212	97	617
Total	4,168	74	810	28,033	71	1,320
Total Annual Benefits		40,492,416				443,943,468

1. Summary of Valuation

Table 10
Distribution of Members Entitled to Deferred Benefits as of July 1, 2019

Current Age	Deferred Vested		
	Count	Avg. Age	Avg. Mo. Benefit
Under 30	73	28	350
30 - 34	280	32	421
35 - 39	464	37	528
40 - 44	626	42	636
45 - 49	846	47	767
50 - 54	894	52	786
55 - 59	881	57	684
60 - 64	525	62	566
65 - 69	144	66	474
70 - 74	11	71	569
75 - 79	2	76	650
80 - 84	-	-	-
85 - 89	1	87	1,039
90 - 94	-	-	-
95 & over	-	-	-
Total	4,747	49	656
Total Annual Benefits		37,374,492	

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 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 5 years of credited service, 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 10.0% of members' compensation to the retirement system. Prior employer contribution rates are as follows:

- July 1, 2017 to July 1, 2018 11.0%
- 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

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 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, 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 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.

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 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.

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.

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 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 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 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.

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 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.

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.

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, 2019

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, 2013, to June 30, 2018. These assumptions will remain in effect for valuation purposes until the Board adopts revised assumptions.

Interest Rate and Expenses

The valuation interest assumption is 7.50% 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 3.10% to 5.30% per year
- Nonstate 3.35% to 6.50% 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
- 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

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

3. Actuarial Assumptions and Methods

Withdrawal from Service

Withdrawal rates are shown in the Appendix. 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.

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%

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	5.300%	6.500%	40	4.300%	4.100%
20	5.300	6.500	41	4.275	4.075
21	5.250	6.240	42	4.250	4.050
22	5.200	5.980	43	4.225	4.025
23	5.150	5.720	44	4.200	4.000
24	5.100	5.460	45	4.175	3.975
25	5.050	5.200	46	4.150	3.950
26	5.000	5.080	47	4.125	3.925
27	4.950	4.960	48	4.100	3.900
28	4.900	4.840	49	4.025	3.875
29	4.850	4.720	50	3.950	3.850
30	4.800	4.600	51	3.875	3.800
31	4.750	4.550	52	3.800	3.750
32	4.700	4.500	53	3.713	3.700
33	4.650	4.450	54	3.625	3.650
34	4.600	4.400	55	3.538	3.600
35	4.550	4.350	56	3.450	3.550
36	4.500	4.300	57	3.363	3.500
37	4.450	4.250	58	3.275	3.450
38	4.400	4.200	59	3.188	3.400
39	4.350	4.150	60+	3.100	3.350

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