

West Virginia Public Employees' Retirement System

Actuarial Valuation as of July 1, 2022

March 2023



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

March 31, 2023

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, 2022. 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 9.0% 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.

The valuation results reflect the \$2,550 annual pay increase effective July 1, 2022 for all active members of PERS. This flat-dollar increase was used in the valuation in place of the assumed salary scales for FY 2023.

Valuation results presented in this report are developed for use by the West Virginia Consolidated Public Retirement Board in assessing the funding requirements of the System. Measurements made for financial reporting purposes under GASB Statements Nos. 67 and 68 are reported separately. Use of this report for any other purpose or by other parties 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.

Future actuarial measurements may differ significantly from current measurements due to system experience differing from that anticipated by the actuarial assumptions, changes expected as part of the natural operation of the methodology used for these measurements, and changes in system provisions, or applicable law or regulations. An analysis of the potential range of such future differences is beyond the scope of this valuation. However, Actuarial Standard of Practice No. 51 requires certain disclosures of potential risks to the System, which provide 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 Actuarial Standard of Practice No. 51 are developed by the Board Actuary and reported separately.

The valuation is based on member data as of June 30, 2022, maintained by the West Virginia Consolidated Public Retirement Board, and financial information received from the West Virginia Investment Management Board. Buck reviewed the data for reasonableness and consistency with data provided for prior valuations but did not audit the data. The accuracy of the results of the valuation is dependent on the accuracy of the data.

This report fairly presents the actuarial position of the West Virginia Public Employees' Retirement System as of July 1, 2022, 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 in view of PERS's experience and represent our best estimate of anticipated future experience of PERS. The mortality improvement assumption was selected in accordance with Actuarial Standard of Practice No. 35.

Actuarial Standards of Practice No. 27 and No. 35 require the actuary to disclose the information and analysis used to support the actuary's determination that the assumptions selected by the plan sponsor do not significantly conflict with those that, in the actuary's professional judgment, are reasonable for the purpose of the measurement. Buck provides advice on reasonable assumptions when performing periodic experience studies. The Board selects the assumptions used and the signing actuaries review the assumptions annually through discussion with the Board Actuary and analysis of actuarial experience.

In the case of the Board's selected assumed rate of return on assets, the signing actuaries have used economic information provided by Buck's Investment Consulting and Financial Risk Management practices. Buck's Capital Market Assumptions provide relevant expected returns, standard deviations, and correlations. Projected returns are then developed for the portfolio using the GEMS[®] Economic Scenario Generator from Conning & Company. This sophisticated model uses a multifactor approach to create internally consistent, realistic economic scenarios for all asset classes that reflect the current economic environment as a starting point. Equity returns include stochastic volatility with jumps to reflect extreme infrequent events. However, such scenarios do not typically impact the 5th through 95th percentiles. Corporate bond yields are generated by adding credit spreads to the corresponding zero-coupon Treasury yields. The credit spread is driven by several factors, including equity returns, and also contains a shock process to allow the model to generate scenarios like the 2008 Financial Crisis. GEMS[®] does not, however, model specific risks such as war, pandemics, political risks, severe economic dislocations occurring with greater frequency or severity than predicted by the model, or the risk that relationships among macroeconomic variables may differ from those of the past. From these scenarios, a probabilistic model of expected returns is created reflecting the duration of investment and the approximate allocation of assets in the portfolio to various asset classes. Under current calibrations, GEMS[®] will tend to show higher expected returns for longer durations and a greater divergence between arithmetic and geometric average returns at higher standard deviations of portfolio return.


Based on the actuaries' analysis, including consistency with other assumptions used in the valuation, discussions with Buck's investment consultants, the percentiles generated by the GEMS[®] model, and review of actuarial gain/loss analysis, the signing actuaries believe the assumptions, in their professional judgment, are reasonable for the purposes of the measurements.

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 does not represent 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.

Actuarial Standard of Practice No. 56 provides guidance to actuaries performing actuarial services with respect to designing, developing, selecting, modifying, using, reviewing, or evaluating models. In addition to the GEMS® model disclosed above, Buck uses third-party software to perform annual actuarial valuations and projections. The model is intended to calculate the liabilities associated with the System’s provisions using data and assumptions as of the measurement date under the funding methods specified in this report. The output from the third-party vendor software is used as input to an internally developed model that applies applicable funding methods and policies to the derived liabilities and other inputs, such as plan assets and contributions, to generate many of the exhibits found in this report. Buck has an extensive review process in which the results of the liability calculations are checked using detailed sample life output, changes from year to year are summarized by source, and significant deviations from expectations are investigated. Other funding outputs and the internal model are similarly reviewed in detail and at a higher level for accuracy, reasonability, and consistency with prior results. Buck also reviews the third-party model when significant changes are made to the software. This review is performed by experts within Buck who are familiar with applicable funding methods, as well as the manner in which the model generates its output. If significant changes are made to the internal model, extra checking and review are completed.

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, 2022, 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, 2021, 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 9.0% 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 13-year period (30 years from July 1, 2005) and the amount required to amortize the liability for benefit improvements to annuitants under HB 3095 over a 3-year period (6 years from July 1, 2019).

The valuation results reflect the \$2,550 annual pay increase effective July 1, 2022 for all active members of PERS. This flat-dollar increase was used in the valuation in place of the assumed salary scales for FY 2023.

Comments on Valuation Results

Table 1 presents the development of the valuation results as of July 1, 2022, and, for comparison purposes, July 1, 2021. The calculated Employer cost is determined as the Employer's share of the normal cost (the cost to fund benefits accruing during the year), plus amortization of the unfunded liability segments over the specified periods.

Table 2a presents the development of the actuarial gain/(loss) as of July 1, 2022. Table 2b presents a reconciliation of the unfunded liability compared to the prior year. Table 2c provides detail on the sources of the liability gain/(loss).

The actual unfunded liability of \$95.2 million differed from the expected amount of \$117.5 million due to the following reasons:

- The demographic and salary experience resulted in a net liability loss of \$17.7 million, which is 0.22% of the expected liability.
- The return on the actuarial value of assets for the year ending June 30, 2022, was approximately 7.78%, which was slightly higher than the assumed return of 7.25%. This favorable investment experience resulted in an asset gain of \$40.1 million.

1. Summary of Valuation

Table 3a presents a projection of the primary unfunded liability to June 30, 2035. The primary unfunded liability at the valuation date is \$93.8 million. This table shows the expected pattern of change in the primary unfunded liability over the remaining 13-year period. Table 3b presents a projection of the unfunded liability for benefit improvements to annuitants attributable to HB 3095 through June 30, 2025. This unfunded liability at the valuation date is \$1.4 million. This table shows the expected pattern of change in this unfunded liability over the remaining 3-year period.

Table 4 presents a cash flow projection of expected asset balances, contributions, benefit payments, and earnings on a closed-group basis through the fiscal year ending June 30, 2047. Under the plan sponsor's funding policy of contributing the actuarially determined contribution, and under the assumption that there are no future experience gains or losses, future expected plan contributions are expected to decline as a percent of pay until the plan is fully funded, at which time they will decrease to a lower level percent of pay. The System's funded percentage is expected to increase and eventually reach 100%.

Funding Progress

Table 5a presents the market value and actuarial value of assets for the fiscal year ending June 30, 2022 and, for comparison purposes, the fiscal year ending June 30, 2021. Table 5b presents the 4-year smoothing of deferred gains and losses used in the calculation of the actuarial value of assets. Table 6 presents the change in market value of assets for the fiscal year ending June 30, 2022.

System Membership

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

Group	July 1, 2022	July 1, 2021
Actives	34,952	35,576
Retirees and Beneficiaries	29,405	29,009
Terminated Vested	5,132	4,929
Terminated Non-Vested	<u>23,876</u>	<u>22,448</u>
Total	93,365	91,962

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

Tables 9a and 9b show the number and total compensation for State and Nonstate active members by 5-year age and eligibility service groupings as of July 1, 2022.

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

1. Summary of Valuation

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

	July 1, 2022	July 1, 2021
Membership:		
• Active	34,952	35,576
• Inactive	58,413	56,386
• Total	<u>93,365</u>	<u>91,962</u>
1. Present Value of Future Benefits		
a. Active	\$ 4,429,539	\$ 4,356,413
b. Inactive:		
• Retirees	3,951,341	3,796,057
• Disabled Retirees	202,862	207,456
• Beneficiaries	375,618	358,598
• Vested Terminated	258,988	245,525
• Non-Vested Terminated	<u>29,572</u>	<u>24,611</u>
c. Total	\$ 9,247,920	\$ 8,988,660
2. Actuarial Accrued Liability	\$ 8,179,835	\$ 7,942,242
3. Assets at Actuarial Value	\$ 8,084,685	\$ 7,745,853
4. Unfunded Actuarial Accrued Liability (2) - (3)	\$ 95,150	\$ 196,389
a. Primary Unfunded	\$ 93,766	\$ 194,605
b. Improvements for annuitants per HB 3095	\$ 1,384	\$ 1,784
5. Annual Normal Cost Rate (Tier 1)		
a. Present Value of Future Normal Cost	\$ 664,320	\$ 703,789
b. Present Value of Future Payroll	\$ 6,828,236	\$ 7,196,083
c. Normal Cost Rate as a % of Payroll (5a) / (5b)	9.73%	9.78%
d. Employee Contribution Rate	4.50%	4.50%
e. Employer Share of Normal Cost	5.23%	5.28%
f. Valuation Compensation FY 2023 (2022)	\$ 1,069,837	\$ 1,109,449
6. Annual Normal Cost Rate (Tier 2)		
a. Present Value of Future Normal Cost	\$ 403,765	\$ 342,629
b. Present Value of Future Payroll	\$ 4,493,535	\$ 3,817,084
c. Normal Cost Rate as a % of Payroll (6a) / (6b)	8.99%	8.98%
d. Employee Contribution Rate	6.00%	6.00%
e. Employer Share of Normal Cost	2.99%	2.98%
f. Valuation Compensation FY 2023 (2022)	\$ 586,848	\$ 501,949
7. Calculated Employer Cost FY 2023 (2022)		
a. Amortization Payment on UAAL MOY ¹	\$ 10,987	\$ 21,810
b. Amortization Payment on HB 3095 MOY ²	511	511
c. Employer Normal Cost MOY	<u>76,117</u>	<u>76,156</u>
d. Total Employer Cost MOY	\$ 87,615	\$ 98,477
e. Employer Cost as Percentage of Compensation	5.29%	6.11%
8. Expected Employer Contributions FY 2023 (2022)		
a. Employer Contribution Rate	9.00%	10.00%
b. Employer Contribution	\$ 149,102	\$ 161,140

¹ FY 2023 amortization payment is over 13 years (30 years from July 1, 2005).

² FY 2023 amortization payment is over 3 years (6 years from July 1, 2019).

1. Summary of Valuation

Table 2a
Actuarial Gain/(Loss) as of July 1, 2022 (000's omitted)

	Amount
1. Expected Actuarial Accrued Liability	
a. Actuarial Accrued Liability as of July 1, 2021	\$ 7,942,242
b. Normal Cost	153,579
c. Interest on (a) and (b) at 7.25%	586,947
d. Benefit Payments and Transfers	(502,699)
e. Interest on (d) at 7.25%, Adjusted for Timing	(17,904)
f. Assumption Changes	0
g. Plan Changes	0
h. Expected Actuarial Accrued Liability as of July 1, 2022	<u>\$ 8,162,165</u>
2. Actual Actuarial Accrued Liability as of July 1, 2022	\$ 8,179,835
3. Liability Gain/(Loss): (1h) - (2)	\$ (17,670)
4. Expected Actuarial Asset Value	
a. Actuarial Value of Assets as of July 1, 2021	\$ 7,745,853
b. Interest on (a) at 7.25%	561,574
c. Member Contributions	81,165
d. Employer Contributions	167,761
e. Interest on (c) and (d) at 7.25%, Adjusted for Timing	8,866
f. Benefit Payments and Transfers	(502,699)
g. Interest on (f) at 7.25%, Adjusted for Timing	(17,904)
h. Expected Actuarial Asset Value as of July 1, 2022	<u>\$ 8,044,616</u>
5. Actual Actuarial Asset Value as of July 1, 2022	\$ 8,084,685
6. Actuarial Asset Value Gain/(Loss): (5) - (4h)	\$ 40,069
7. Total Actuarial Gain/(Loss): (3) + (6)	\$ 22,399

1. Summary of Valuation

Table 2b
Change in Unfunded Liability during FY 2022 (000's omitted)

	Amount
1. Unfunded Liability as of July 1, 2021	\$ 196,389
a. Interest on Unfunded Liability at 7.25%	\$ 14,238
b. Normal Cost	153,579
c. Member Contributions	(81,165)
d. Employer Contributions	(167,761)
e. Interest on (b) through (d) at 7.25%, Adjusted for Timing	2,269
f. Assumption Changes	0
g. Plan Changes	0
h. Expected Change in Unfunded Liability during FY 2022	<u>\$ (78,840)</u>
2. Expected Unfunded Liability as of July 1, 2022: (1) + (1h)	\$ 117,549
a. Liability (Gain)/Loss during FY 2022	\$ 17,670
b. Actuarial Assets (Gain)/Loss during FY 2022	<u>(40,069)</u>
c. Total Actuarial (Gain)/Loss during FY 2022	\$ (22,399)
3. Actual Unfunded Liability as of July 1, 2022: (2) + (2c)	\$ 95,150

1. Summary of Valuation

Table 2c

Liability Gain/(Loss) by Source as of July 1, 2022 (000's omitted)

	Gain/(Loss)
1. Demographic and Salary Experience	
a. Retirement Experience	\$ (9,814)
b. Termination Experience	(7,468)
c. Disability Experience	(2,600)
d. Active Mortality Experience	11,023
e. Inactive Mortality Experience	6,276
f. Salary Increases	(38,955)
g. New Entrants and Rehires	(12,132)
h. Benefit Payments Different Than Expected	19,881
i. Miscellaneous ¹	16,119
j. Total	<u>\$ (17,670)</u>
2. Assumption Changes	\$ 0
3. Plan Changes	\$ 0
4. Total	\$ (17,670)

¹ Includes the effects of data updates typical of the annual reconciliation, programming revisions, software updates, and other experience which does not fit the other demographic categories.

1. Summary of Valuation

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

Fiscal Year Ending 6/30	Unfunded Liability at Beg. of Year	Projected Total Payroll	Amortization Payments	
			% of Payroll	Amount
2023	\$ 93,766	\$ 1,656,685	0.66%	\$ 10,987
2024	89,186	1,727,094	0.64%	10,987
2025	84,273	1,800,496	0.61%	10,987
2026	79,005	1,877,017	0.59%	10,987
2027	73,354	1,956,790	0.56%	10,987
2028	67,294	2,039,953	0.54%	10,987
2029	60,795	2,126,651	0.52%	10,987
2030	53,824	2,217,034	0.50%	10,987
2031	46,348	2,311,258	0.48%	10,987
2032	38,330	2,409,487	0.46%	10,987
2033	29,731	2,511,890	0.44%	10,987
2034	20,508	2,618,645	0.42%	10,987
2035	10,616	2,729,937	0.40%	10,987

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

Fiscal Year Ending 6/30	Unfunded Liability at Beg. of Year	Projected Total Payroll	Amortization Payments	
			% of Payroll	Amount
2023	\$ 1,384	\$ 1,656,685	0.03%	\$ 511
2024	955	1,727,094	0.03%	511
2025	495	1,800,496	0.03%	511

1. Summary of Valuation

Table 4
Cash Flow Projection FY 2023 through FY 2047 (000's omitted)

FY Ending 6/30	Market Value of Assets Beg. of Year	Expected Contributions	Benefits	Earnings	Net Income	Market Value of Assets End of Year
2023	\$ 8,007,329	\$ 232,456	\$ 565,795	\$ 568,659	\$ 235,320	\$ 8,242,649
2024	8,242,649	211,508	555,580	585,338	241,266	8,483,915
2025	8,483,915	197,835	573,693	601,697	225,839	8,709,754
2026	8,709,754	186,497	591,957	617,016	211,556	8,921,310
2027	8,921,310	176,363	610,736	631,324	196,951	9,118,261
2028	9,118,261	166,535	628,968	644,604	182,171	9,300,432
2029	9,300,432	156,890	646,697	656,836	167,029	9,467,461
2030	9,467,461	147,274	663,677	667,999	151,596	9,619,057
2031	9,619,057	137,800	680,140	678,066	135,726	9,754,783
2032	9,754,783	128,648	696,581	686,994	119,061	9,873,844
2033	9,873,844	119,597	712,153	694,749	102,193	9,976,037
2034	9,976,037	110,895	727,564	701,300	84,631	10,060,668
2035	10,060,668	102,689	741,441	706,649	67,897	10,128,565
2036	10,128,565	94,950	753,443	710,868	52,375	10,180,940
2037	10,180,940	87,592	763,888	714,031	37,735	10,218,675
2038	10,218,675	80,582	772,449	716,213	24,346	10,243,021
2039	10,243,021	74,017	779,284	717,500	12,233	10,255,254
2040	10,255,254	67,862	784,229	717,992	1,625	10,256,879
2041	10,256,879	62,008	787,619	717,781	(7,830)	10,249,049
2042	10,249,049	56,537	788,719	716,979	(15,203)	10,233,846
2043	10,233,846	51,441	787,717	715,731	(20,545)	10,213,301
2044	10,213,301	46,722	784,665	714,182	(23,761)	10,189,540
2045	10,189,540	42,437	779,734	712,482	(24,815)	10,164,725
2046	10,164,725	38,492	772,662	710,795	(23,375)	10,141,350
2047	10,141,350	34,868	763,793	709,287	(19,638)	10,121,712

Notes:

- Earnings are based on an assumed asset return of 7.25%.
- The fund balance as of July 1, 2022 is the market value of the fund.
- Contributions are based on a Tier 1 member contribution rate of 4.5%, a Tier 2 member contribution rate of 6.0%, and a State contribution rate of 9.0% times the projected payroll on a closed-group basis.
- The 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.
- No new entrants are assumed in this projection.

1. Summary of Valuation

Table 5a
Actuarial Value of Assets as of June 30, 2022 (000's omitted)

	June 30, 2022	June 30, 2021
Assets		
• Cash with State Treasurer	\$ 789	\$ 744
• Investments at Fair Value	8,004,836	8,807,095
• Contributions Receivable	5,235	4,193
• Other Receivables	123	33
• Total Assets	<u>\$ 8,010,983</u>	<u>\$ 8,812,065</u>
Liabilities		
• Accrued Expenses and Other Payables	<u>3,654</u>	<u>6,181</u>
Market Value of Assets	\$ 8,007,329	\$ 8,805,884
Adjustment for Deferred Gains / (Losses)	<u>(77,356)</u>	<u>1,060,031</u>
Actuarial Value of Assets	\$ 8,084,685	\$ 7,745,853

Table 5b
Four-Year Asset Smoothing as of June 30, 2022 (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
2022	\$ (1,098,556)	75%	\$ (823,917)	\$ (274,639)
2021	1,638,971	50%	819,486	409,743
2020	(291,701)	25%	(72,925)	(72,925)
2019	(93,383)	0%	0	(23,346)
Total			<u>\$ (77,356)</u>	<u>\$ 38,833</u>

1. Summary of Valuation

Table 6

Changes in Market Value of Assets for Year Ended June 30, 2022 (000's omitted)

	Amount
Market Value of Assets - Beginning of Year	\$ 8,805,884
Additions:	
• Contributions:	
○ Member - Tier 1	48,198
○ Member - Tier 2	32,967
○ Employer - Tier 1	113,038
○ Employer - Tier 2	54,723
○ Reinstatements	-
○ Special Appropriation	-
○ Subtotal	<u>\$ 248,926</u>
• Investment Income:	
○ Net Appreciation ¹ and Interest	(542,500)
○ Other Return in Investments	-
○ Subtotal	<u>\$ (542,500)</u>
• Other Income	<u>1,238</u>
• Total	<u>\$ (292,336)</u>
Deductions and Transfers:	
• Benefit Expense	489,324
• Refunds of Contributions	13,395
• Administrative Expenses	3,520
• Transfers to / (from) Other Systems	<u>(20)</u>
• Total	<u>\$ 506,219</u>
Net Increase	(798,555)
Market Value of Assets - End of Year	\$ 8,007,329
Investment Return for Year on Market Value:	
• Valuation Purposes (assumes mid-year transactions and offsets investment income by investment and administrative expense)	(6.29%)
• Per Investment Management Board (time-weighted, excluding administrative expense)	(6.40%)

¹ Net of investment expense

1. Summary of Valuation

Table 7
Reconciliation of System Members

	Active	Non-Vested Terms	Vested Terms	Service Retirees	Disabled Retirees	Beneficiaries	Total
Census as of July 1, 2021	35,576	22,448	4,929	22,478	2,094	4,437	91,962
• New Entrants	3,808	710	-	-	-	-	4,518
• Returned to Active Status	472	(326)	(135)	(11)	-	-	-
• Terminated Non-Vested	(2,005)	2,005	-	-	-	-	-
• Terminated Vested	(690)	(1)	691	-	-	-	-
• Withdrew Contributions	(790)	(445)	(139)	-	-	-	(1,374)
• Transferred out	-	(1)	(1)	-	-	-	(2)
• Retired	(1,224)	(15)	(169)	1,408	-	-	-
• Disabled	(45)	(2)	(10)	-	57	-	-
• Deceased	(117)	(146)	(36)	(920)	(109)	(297)	(1,625)
• New Beneficiaries	-	-	-	-	-	379	379
• New QDRO's	-	-	-	-	-	12	12
• Adjustments	(33)	(351)	2	1	-	(124)	(505)
Census as of July 1, 2022	34,952	23,876	5,132	22,956	2,042	4,407	93,365

1. Summary of Valuation

Table 8
Summary of Membership and Payroll

	July 1, 2022	July 1, 2021
Active Members		
• State Employees	22,162	22,875
• Nonstate Employees	12,790	12,701
• Total	<u>34,952</u>	<u>35,576</u>
• Tier 1 Employees	20,322	22,268
• Tier 2 Employees	14,630	13,308
• Total	<u>34,952</u>	<u>35,576</u>
• Average Age	46.95	46.91
• Average Service	10.59	10.62
Inactive Members		
• Service Retirees	22,956	22,478
• Disabled Retirees	2,042	2,094
• Beneficiaries	4,407	4,437
• Vested Terminated	5,132	4,929
• Non-Vested Terminated	23,876	22,448
• Total	<u>58,413</u>	<u>56,386</u>
Payroll for Normal Cost		
• State Employees	\$ 1,081,977,000	\$ 1,072,666,000
• Nonstate Employees	574,708,000	538,732,000
• Total	<u>\$ 1,656,685,000</u>	<u>\$ 1,611,398,000</u>
• Tier 1 Employees	\$ 1,069,837,000	\$ 1,109,449,000
• Tier 2 Employees	586,848,000	501,949,000
• Total	<u>\$ 1,656,685,000</u>	<u>\$ 1,611,398,000</u>
PV of Future Payroll	\$ 11,321,771,000	\$ 11,013,167,000
PV of Member Contributions	\$ 576,883,000	\$ 552,849,000

1. Summary of Valuation

Table 9a
Distribution of Active Members as of July 1, 2022 - State

Attained Age	Years of Eligibility Service									Total
	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 & up	
	Count / Total Comp	Count / Total Comp	Count / Total Comp	Count / Total Comp	Count / Total Comp	Count / Total Comp	Count / Total Comp	Count / Total Comp	Count / Total Comp	
Under 25	932	13	-	-	-	-	-	-	-	945
	33,041,691	645,489	-	-	-	-	-	-	-	33,687,180
25 - 29	1,274	266	7	-	-	-	-	-	-	1,547
	49,901,364	12,841,134	340,271	-	-	-	-	-	-	63,082,769
30 - 34	972	677	159	-	-	-	-	-	-	1,808
	38,820,035	32,978,691	8,183,357	-	-	-	-	-	-	79,982,083
35 - 39	875	609	496	130	4	-	-	-	-	2,114
	34,884,640	29,487,168	26,374,971	7,164,594	185,401	-	-	-	-	98,096,774
40 - 44	855	601	556	421	140	3	-	-	-	2,576
	34,965,021	29,717,538	28,821,601	24,054,819	8,379,919	129,471	-	-	-	126,068,369
45 - 49	879	630	494	422	481	146	5	-	-	3,057
	35,822,962	30,150,662	26,110,194	23,699,989	28,950,957	9,274,203	248,014	-	-	154,256,981
50 - 54	833	690	564	431	538	455	141	6	-	3,658
	34,169,023	32,937,018	29,073,875	22,740,226	31,201,301	30,236,238	9,604,577	357,799	-	190,320,057
55 - 59	714	572	537	427	388	251	213	64	3	3,169
	29,887,706	27,082,802	26,774,306	22,655,820	21,872,261	16,141,374	13,966,086	3,909,568	156,867	162,446,790
60 - 64	360	418	387	292	275	161	113	96	29	2,131
	15,514,921	20,020,159	18,914,946	15,282,657	15,075,137	10,025,428	7,506,112	6,323,357	1,543,232	110,205,949
65 - 69	109	140	144	124	77	56	52	37	57	796
	5,133,422	7,522,403	7,498,220	6,694,702	4,367,613	3,316,113	3,442,101	2,400,245	3,614,612	43,989,431
70 & up	57	52	67	53	46	21	23	12	30	361
	2,847,297	2,647,991	3,663,403	2,709,853	2,449,354	1,301,196	1,408,869	798,176	2,014,006	19,840,145
Total	7,860	4,668	3,411	2,300	1,949	1,093	547	215	119	22,162
	314,988,082	226,031,055	175,755,144	125,002,660	112,481,943	70,424,023	36,175,759	13,789,145	7,328,717	1,081,976,528

1. Summary of Valuation

Table 9b
Distribution of Active Members as of July 1, 2022 - Nonstate

Attained Age	Years of Eligibility Service									Total
	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 & up	
	Count / Total Comp	Count / Total Comp	Count / Total Comp	Count / Total Comp	Count / Total Comp	Count / Total Comp	Count / Total Comp	Count / Total Comp	Count / Total Comp	
Under 25	731	11	-	-	-	-	-	-	-	742
	24,294,776	486,386	-	-	-	-	-	-	-	24,781,162
25 - 29	786	190	4	-	-	-	-	-	-	980
	29,553,246	8,412,615	202,866	-	-	-	-	-	-	38,168,727
30 - 34	682	362	94	6	-	-	-	-	-	1,144
	26,698,611	17,341,477	4,405,530	257,547	-	-	-	-	-	48,703,165
35 - 39	601	305	213	74	4	-	-	-	-	1,197
	23,401,683	14,730,580	10,777,422	4,065,489	247,162	-	-	-	-	53,222,336
40 - 44	599	321	250	194	61	5	-	-	-	1,430
	22,539,604	15,153,342	12,859,745	10,975,784	3,413,917	242,268	-	-	-	65,184,660
45 - 49	563	345	224	192	162	78	1	-	-	1,565
	21,378,015	15,551,177	11,334,940	10,396,857	9,624,632	4,764,093	68,789	-	-	73,118,503
50 - 54	613	387	252	209	212	154	79	3	-	1,909
	24,592,220	17,700,939	12,088,759	10,563,233	12,069,478	9,533,923	4,815,792	181,399	-	91,545,743
55 - 59	461	318	284	247	186	121	89	44	5	1,755
	17,830,089	14,322,405	13,424,394	12,212,431	10,157,255	7,035,463	5,018,451	2,691,686	292,547	82,984,721
60 - 64	273	270	207	192	148	76	66	28	26	1,286
	10,837,786	11,706,970	9,572,160	9,480,904	7,699,431	4,408,637	3,932,077	1,883,048	1,733,037	61,254,050
65 - 69	96	120	84	68	49	35	22	18	22	514
	3,733,052	5,388,690	3,887,616	3,454,321	2,283,005	1,671,425	1,225,359	1,058,114	1,282,231	23,983,813
70 & up	43	42	49	37	28	26	19	12	12	268
	1,692,287	1,838,922	1,799,139	1,559,098	1,438,479	1,013,331	989,903	746,802	683,154	11,761,115
Total	5,448	2,671	1,661	1,219	850	495	276	105	65	12,790
	206,551,369	122,633,503	80,352,571	62,965,664	46,933,359	28,669,140	16,050,371	6,561,049	3,990,969	574,707,995

1. Summary of Valuation

Table 10
Distribution of Retired Members as of July 1, 2022

Current Age	Service Retirees			Disabled Retirees		
	Count	Avg. Age	Avg. Mo. Benefit	Count	Avg. Age	Avg. Mo. Benefit
Under 30	-	-	-	1	26	684
30 - 34	-	-	-	-	-	-
35 - 39	-	-	-	1	39	2,006
40 - 44	-	-	-	10	43	1,245
45 - 49	-	-	-	45	48	1,349
50 - 54	-	-	-	131	52	1,435
55 - 59	790	58	2,448	238	57	1,429
60 - 64	3,013	62	1,911	401	62	1,370
65 - 69	5,628	67	1,645	444	67	851
70 - 74	5,890	72	1,538	418	72	792
75 - 79	3,695	77	1,404	216	77	687
80 - 84	2,174	82	1,165	87	82	553
85 - 89	1,169	87	985	33	87	396
90 - 94	468	92	829	12	92	487
95 & over	129	97	695	5	96	501
Total	22,956	72	1,540	2,042	67	1,019
Total Annual Benefits			424,316,653	24,957,513		

Current Age	Beneficiaries			Total Pensioners		
	Count	Avg. Age	Avg. Mo. Benefit	Count	Avg. Age	Avg. Mo. Benefit
Under 30	6	26	1,633	7	26	1,497
30 - 34	15	32	979	15	32	979
35 - 39	16	38	725	17	38	800
40 - 44	39	42	874	49	42	950
45 - 49	57	47	919	102	47	1,109
50 - 54	80	52	1,058	211	52	1,292
55 - 59	233	57	1,008	1,261	58	1,990
60 - 64	396	62	1,050	3,810	62	1,765
65 - 69	605	67	996	6,677	67	1,533
70 - 74	724	72	974	7,032	72	1,436
75 - 79	797	77	946	4,708	77	1,294
80 - 84	629	82	789	2,890	82	1,065
85 - 89	477	87	718	1,679	87	898
90 - 94	251	92	639	731	92	758
95 & over	82	97	465	216	97	603
Total	4,407	74	898	29,405	72	1,408
Total Annual Benefits			47,486,006	496,760,172		

1. Summary of Valuation

Table 11
Distribution of Members Entitled to Deferred Benefits as of July 1, 2022

Current Age	Deferred Vested		
	Count	Avg. Age	Avg. Mo. Benefit
Under 30	41	28	412
30 - 34	286	32	485
35 - 39	521	37	553
40 - 44	656	42	644
45 - 49	820	47	815
50 - 54	1,048	52	874
55 - 59	945	57	737
60 - 64	595	61	592
65 - 69	192	67	489
70 - 74	26	70	609
75 - 79	2	77	460
80 - 84	-	-	-
85 - 89	-	-	-
90 - 94	-	-	-
95 & over	-	-	-
Total	5,132	50	703
Total Annual Benefits		43,313,876	

2. Summary of System Provisions

System Name

The West Virginia Public Employees' Retirement System

Effective Date

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

System Membership

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

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

Annual Compensation

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

Final Average Salary

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

Contributions

Member Contributions

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

Employer Contributions

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

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

2. Summary of System Provisions

Service Credits

Prior Service

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

Contributing Service

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

Credited Service

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

Reinstated Service

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

Applied Unused Leave

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

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

Normal Retirement Benefit

Eligibility

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

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

Amount

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

2. Summary of System Provisions

Normal Form

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

Optional Forms

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

Unreduced Early Retirement Benefit (Tier 1)

Eligibility

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

Amount

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

Reduced Early Retirement Benefit (Tier 1)

Eligibility

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

Amount

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

2. Summary of System Provisions

Reduced Early Retirement Benefit (Tier 2)

Eligibility

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

Amount

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

Disability Benefit

Eligibility

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

Amount

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

Deferred Vested Benefit (Tier 1)

Eligibility

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

Amount

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

2. Summary of System Provisions

Deferred Vested Benefit (Tier 2)

Eligibility

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

Amount

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

Pre-Retirement Death Benefits

Eligibility

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

Amount

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

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

Post-Retirement Death Benefits

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

Other Terminations

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

Minimum Benefits Established under HB 3095

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

3. Actuarial Assumptions and Methods

Valuation Date

July 1, 2022

Funding Method

The valuation is prepared under the Entry Age Normal Cost Method with individually computed accrued liabilities. The Normal Cost is computed in aggregate. Entry is based on date of hire.

Basis for Assumptions

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

The valuation reflects economic assumptions, which include a rate of investment return of 7.25% per annum, as adopted by the Board, and assumed future salary increases, which were based on the findings presented in the July 1, 2015 – June 30, 2020 Experience Study. These assumptions will remain in effect for valuation purposes until the Board adopts revised economic assumptions.

Interest Rate and Expenses

The valuation interest assumption is 7.25% per annum, with no loading for system expenses.

Salary Scales

The salary scales are shown in the Appendix. Salary scales include an assumed underlying inflation rate of 2.75%. The ranges of projected salary increases are as follows:

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

The valuation results reflect the \$2,550 annual pay increase effective July 1, 2022 for all active members of PERS. This flat-dollar increase was used in the valuation in place of the assumed salary scales for FY 2023.

Pre-Retirement Mortality

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

Post-Retirement Mortality

The post-retirement mortality tables are as follows:

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

3. Actuarial Assumptions and Methods

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

Withdrawal from Service

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

Disablement Rates

Disablement rates are shown in the Appendix.

Retirement Rates

Retirement rates are shown in the Appendix.

Family Composition

It is assumed that 85% of males and 80% of females are married, with husbands 3 years older than their wives. Remarriage rates are not used.

Accrual of Future Service

It is assumed that active members will accrue 1 year of service for each future year of employment.

Noncontributory Service Loadings

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

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

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

3. Actuarial Assumptions and Methods

Asset Valuation Method

4-year 25% level smoothing of actuarial gain or (loss) on trust fund return:

- Implemented over 4 years, prospectively commencing July 1, 2009 for the experience for the trust year ending June 30, 2009.
- Actuarial gain or (loss) on assets is calculated as the difference between the expected return under valuation assumptions based on the smoothed Actuarial Value of Assets and the actual trust fund return.
- Actuarial gain or (loss) is recognized at 25% of the original amount each year until fully recognized in the fourth year.
- Total accumulated deferred gain or (loss) amounts are used to adjust the reported Market Value of Assets to determine the Actuarial Value of Assets.

System Contributions

Both employee and employer contributions to the System are assumed to be paid in the middle of the year.

Changes in Assumptions Since the Prior Valuation

The valuation results reflect the \$2,550 annual pay increase effective July 1, 2022 for all active members of PERS. This flat-dollar increase was used in the valuation in place of the assumed salary scales for FY 2023.

Appendix – Detailed Assumptions

Salary Scales

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

Appendix – Detailed Assumptions

Withdrawal Rates for State (less than 1 year)

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

Withdrawal Rates for State (1 to 2 years)

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

Appendix – Detailed Assumptions

Withdrawal Rates for State (2 to 3 years)

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

Withdrawal Rates for State (3 to 4 years)

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

Appendix – Detailed Assumptions

Withdrawal Rates for State (4 to 5 years)

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

Withdrawal Rates for State (greater than 5 years)

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

Appendix – Detailed Assumptions

Withdrawal Rates for Nonstate (less than 1 year)

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

Withdrawal Rates for Nonstate (1 to 2 years)

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

Appendix – Detailed Assumptions

Withdrawal Rates for Nonstate (2 to 3 years)

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

Withdrawal Rates for Nonstate (3 to 4 years)

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

Appendix – Detailed Assumptions

Withdrawal Rates for Nonstate (4 to 5 years)

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

Withdrawal Rates for Nonstate (greater than 5 years)

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

Appendix – Detailed Assumptions

Disability Rates for State and Nonstate

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

Retirement Rates for State and Nonstate

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