

Vermont State Employees' Retirement System

**Governmental Accounting Standards Board
Statement 67 Actuarial Valuation Report as of
June 30, 2021**





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November 10, 2021

Board of Trustees
Vermont State Employees' Retirement System
Montpelier, Vermont 05609

Dear Board Members:

We are pleased to submit this Governmental Accounting Standards Board (GASB) Statement No. 67 Accounting Valuation as of June 30, 2021, for the Vermont State Employees' Retirement System, a single-employer defined benefit pension plan. It contains the actuarial information that will need to be disclosed in order to comply with GASB 67.

This report was prepared in accordance with generally accepted actuarial principles and practices at the request of the Board to assist the Board and the member units in preparing their financial reports. The financial information on which our calculations were based was provided by the Office of the State Treasurer. That assistance is gratefully acknowledged.

The measurements shown in this actuarial valuation may not be applicable for other purposes. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; and changes in plan provisions or applicable law.

An actuarial valuation is a measurement at a specific date – it is not a prediction of a plan's future financial condition. We have not been retained to perform an analysis of the potential range of financial measurements, except where otherwise noted.

The actuarial calculations were directed under the supervision of Matthew A. Strom, FSA, MAAA, EA. We are members of the American Academy of Actuaries and we meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. To the best of our knowledge, the information supplied in this actuarial valuation is complete and accurate.

This valuation was prepared based on the actuarial assumptions and methods used in the June 30, 2020, actuarial valuation of the System, except as noted herein. In our opinion, the assumptions as approved by the Board are reasonably related to the experience of and the expectations for the System and are appropriate for purposes of the valuation.

We look forward to reviewing this report with you and to answering any questions.

Sincerely,

Segal



Kathleen A. Riley, FSA, MAAA, EA
Senior Vice President and Actuary



Matthew A. Strom, FSA, MAAA, EA
Senior Vice President and Actuary

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Section 1: Actuarial Valuation Summary

Important information about actuarial valuations

An actuarial valuation is a budgeting tool with respect to the financing of future projected obligations of a pension plan. It is an estimated forecast – the actual long-term cost of the plan will be determined by the actual benefits and expenses paid and the actual investment experience of the plan.

In order to prepare a valuation, Segal relies on a number of input items. These include:

Plan of benefits	Plan provisions define the rules that will be used to determine benefit payments, and those rules, or the interpretation of them, may change over time. Even where they appear precise, outside factors may change how they operate. It is important to keep Segal informed with respect to plan provisions and administrative procedures, and to review the plan summary included in our report to confirm that Segal has correctly interpreted the plan of benefits.
Participant data	An actuarial valuation for a plan is based on data provided to the actuary by the System. Segal does not audit such data for completeness or accuracy, other than reviewing it for obvious inconsistencies compared to prior data and other information that appears unreasonable. It is important for Segal to receive the best possible data and to be informed about any known incomplete or inaccurate data.
Assets	The valuation is based on the market value of assets as of the valuation date, as provided by the System. The System uses an “actuarial value of assets” that differs from market value to gradually reflect year-to-year changes in the market value of assets in determining the contribution requirements.
Actuarial assumptions	In preparing an actuarial valuation, Segal projects the benefits to be paid to existing plan participants for the rest of their lives and the lives of their beneficiaries. This projection requires actuarial assumptions as to the probability of death, disability, withdrawal, and retirement of each participant for each year. In addition, the benefits projected to be paid for each of those events in each future year reflect actuarial assumptions as to salary increases and cost-of-living adjustments. The projected benefits are then discounted to a present value, based on the assumed rate of return that is expected to be achieved on the plan’s assets. There is a reasonable range for each assumption used in the projection and the results may vary materially based on which assumptions are selected. It is important for any user of an actuarial valuation to understand this concept. Actuarial assumptions are periodically reviewed to ensure that future valuations reflect emerging plan experience. While future changes in actuarial assumptions may have a significant impact on the reported results, that does not mean that the previous assumptions were unreasonable

Section 1: Valuation Summary

The user of Segal's actuarial valuation (or other actuarial calculations) should keep the following in mind:

The actuarial valuation is prepared at the request of the Vermont State Employees' Retirement System. Segal is not responsible for the use or misuse of its report, particularly by any other party.

An actuarial valuation is a measurement of the plan's assets and liabilities at a specific date. Accordingly, except where otherwise noted, Segal did not perform an analysis of the potential range of future financial measures. The actual long-term cost of the plan will be determined by the actual benefits and expenses paid and the actual investment experience of the plan.

Sections of this report may include actuarial results that are not rounded, but that does not imply precision.

If the System is aware of any event or trend that was not considered in this valuation that may materially change the results of the valuation, Segal should be advised, so that we can evaluate it.

Segal does not provide investment, legal, accounting, or tax advice. Segal's valuation is based on our understanding of applicable guidance in these areas and of the plan's provisions, but they may be subject to alternative interpretations. The System should look to their other advisors for expertise in these areas.

As Segal has no discretionary authority with respect to the management or assets of the System, it is not a fiduciary in its capacity as actuaries and consultants with respect to the System.

Section 1: Valuation Summary

Purpose and basis

This report has been prepared by Segal to present certain disclosure information required by Governmental Accounting Standards Board Statement No. 67 as of June 30, 2021. This report, based on unaudited financial information as of June 30, 2021, provided by the Office of the State Treasurer and the Vermont State Employees' Retirement System Actuarial Valuation Report as of June 30, 2020, dated October 28, 2020, reflects:

- The benefit provisions of the Pension Plan, as administered by the Board; and
- The characteristics of covered active members, inactive members, and retired members and beneficiaries as of June 30, 2020, provided by the Office of the State Treasurer.

The assumptions are the same as shown in the Vermont State Employees' Retirement System Actuarial Valuation Report as of June 30, 2020.

Highlights of the valuation

The following key findings were the result of this actuarial valuation:

- The Net Pension Liability (NPL) is equal to the difference between the Total Pension Liability (TPL) and the Plan's Fiduciary Net Position. The Plan's Fiduciary Net Position is equal to the market value of assets and, therefore, the NPL measure is very similar to an Unfunded Actuarial Accrued Liability (UAAL) on a market value basis. The NPL decreased from \$1.11 billion as of June 30, 2020, to \$829.8 million as of June 30, 2021, and the Plan's Fiduciary Net Position as a percent of the TPL increased from 63.81% to 74.51%.
- The NPL, measured as of June 30, 2021, and June 30, 2020, was determined based on the results of the actuarial valuations as of June 30, 2020, and June 30, 2019, respectively, adjusted using standard actuarial techniques.
- The discount rate used to determine the TPL and NPL as of June 30, 2021, and June 30, 2020, was 7.00%.

Section 2: Accounting Information

Exhibit 1 - Net Pension Liability

The components of the Net Pension Liability of the Vermont State Employees' Retirement System are as follows:

	June 30, 2021	June 30, 2020
Total Pension Liability	\$3,255,050,102	\$3,070,253,079
Plan Fiduciary Net Position	2,425,222,408	1,959,066,641
System's Net Pension Liability	829,827,694	1,111,186,438
Plan Fiduciary Net Position as a percentage of the Total Pension Liability*	74.51%	63.81%

* These funded percentages are not necessarily appropriate for assessing the sufficiency of Plan assets to cover the estimated cost of settling the Plan's benefit obligation or the need for or the amount of future contributions.

Actuarial assumptions. The Total Pension Liability as of June 30, 2021, was determined by rolling forward the Total Pension Liability as of June 30, 2020, to June 30, 2021, using the following actuarial assumptions:

Investment rate of return	7.00%, net of pension plan investment expense, including inflation
Inflation	2.30%
Salary increases	Ranging from 3.40% to 5.55%
Cost of Living Adjustment	2.40% (0.00% for 2021 and 4.60% for 2022) for Groups A, C and D and for Group F members who retired after July 1, 2008, and 1.35% (1.00% for 2021 and 2.30% for 2022) for all other Group F members
Mortality	<ul style="list-style-type: none"> • <i>Pre-Retirement:</i> <ul style="list-style-type: none"> Groups A/F – 60% of PubG-2010 General Employee Amount-Weighted Above Median, 40% of PubG-2010 General Employee Amount-Weighted with generational projection using scale MP-2019 Group C – PubS-2010 Public Safety Employee Amount-Weighted with generational projection using scale MP-2019 Group D* – 70% of PubG-2010 General Employee Amount-Weighted Above Median, 30% of PubG-2010 General Employee with generational projection using scale MP-2019 <p style="text-align: center;">* 30% of deaths are assumed to be accidental</p>

Section 2: Accounting Information

Mortality (continued)

- *Healthy Post-Retirement - Retirees:*
 - Groups A/F – 109% of PubG-2010 General Healthy Retiree Amount-Weighted with generational projection using scale MP-2019
 - Group C – 40% of PubS-2010 Public Safety Retiree Amount-Weighted Above Median, 60% of PubS-2010 Public Safety Retiree Amount-Weighted with generational projection using scale MP-2019
 - Group D – PubG-2010 General Healthy Retiree Amount-Weighted Above Median with generational projection using scale MP-2019
- *Healthy Post-Retirement - Beneficiaries:*
 - Groups A/F – Pub-2010 Contingent Survivor Amount-Weighted with generational projection using MP-2019
 - Group C – 40% of Pub-2010 Contingent Survivor Amount-Weighted Above Median, 60% of Pub-2010 Contingent Survivor Amount-Weighted with generational projection using MP-2019
 - Group D – Pub-2010 Contingent Survivor Amount-Weighted Above Median with generational projection using MP-2019
- *Disabled Post-Retirement:*
 - PubNS-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table with generational projection using scale MP-2019

The tables with the generational projection to the ages of members as of the measurement date reasonably reflect the mortality experience of the System as of the measurement date.

The mortality rates were based on historical and current demographic data, adjusted to reflect health characteristics of the underlying groups and estimated future experience and professional judgment. The mortality tables were then adjusted to future years using the generational projection to reflect future mortality improvement between the measurement date and those years.

Section 2: Accounting Information

Determination of discount rate and investment rates of return

The long-term expected rate of return on pension plan investments was determined using a building-block method in which best-estimate ranges of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class. These ranges are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and by adding expected inflation. Best estimates of arithmetic real rates of return for each major asset class included in the pension plan's target asset allocation as of June 30, 2021, are summarized in the following table:

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return*
Passive Global Equities	24.00%	5.05%
Active Global Equities	5.00%	5.05%
Large Cap US Equities	4.00%	4.00%
Small/Mid Cap US Equities	3.00%	4.50%
Non-US Developed Market Equities	7.00%	5.50%
Private Equity	10.00%	6.75%
Emerging Market Debt	4.00%	3.00%
Private and alternative Credit	10.00%	4.75%
Non-Core Real Estate	4.00%	5.75%
Core Fixed Income	19.00%	0.00%
Core Real Estate	4.00%	3.75%
US TIPS	3.00%	-0.50%
Infrastructure/Farmland	<u>3.00%</u>	4.25%
	100.00%	

* Calculated as the Arithmetic Rates of Return minus the Rate of Inflation, as provided by the Vermont State Treasurers' Office

Section 2: Accounting Information

Discount rate: The discount rate used to measure the Total Pension Liability was 7.00%. In accordance with paragraph 43 of GASB 67, professional judgement was applied to determine that the System's projected Fiduciary Net Position exceeds projected benefit payments for current active and inactive members for all years. Our analysis was based on the expectation that the employer will continue to contribute an amount at least equal to the actuarially determined contribution, which is comprised of an employer normal cost payment and a payment to reduce the unfunded liability to zero by June 30, 2038, in accordance with Vermont statute. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the Total Pension Liability.

Discount rate sensitivity

Sensitivity of the Net Pension Liability to changes in the discount rate. The following presents the Net Pension Liability, calculated using the discount rate of 7.00%, as well as what the Net Pension Liability would be if it were calculated using a discount rate that is 1-percentage-point lower (6.00%) or 1-percentage-point higher (8.00%) than the current rate:

	1% Decrease (6.00%)	Current Discount Rate (7.00%)	1% Increase (8.00%)
Net Pension Liability as of June 30, 2021	\$1,254,766,935	\$829,827,694	\$480,073,229

Section 2: Accounting Information

Exhibit 2 - Schedule of changes in Net Pension Liability – last ten fiscal years

	Year End June 30,				
	2021	2020	2019	2018	2017
Total Pension Liability					
Service cost	\$70,993,081	\$53,009,586	\$51,945,814	\$49,743,850	\$42,703,770
Interest	214,277,050	204,548,093	194,126,755	180,860,845	178,958,654
Differences between expected and actual experience	59,817,790	5,122,992	40,475,950	83,265,679	19,283,274
Changes of assumptions	0	209,786,856	0	0	42,724,968
Changes of benefit terms	0	0	0	0	0
Benefit payments, including refunds of employee contributions	-160,290,898	-153,025,531	-144,296,719	-134,090,344	-126,479,801
Net change in Total Pension Liability	\$184,797,023	\$319,441,996	\$142,251,800	\$179,780,030	\$157,190,865
Total Pension Liability – beginning	3,070,253,079	2,750,811,083	2,608,559,283	2,428,779,253	2,271,588,388
Total Pension Liability – ending (a)	\$3,255,050,102	\$3,070,253,079	\$2,750,811,083	\$2,608,559,283	\$2,428,779,253
Plan Fiduciary Net Position					
Contributions – employer	\$88,944,172	\$84,429,972	\$66,617,894	\$64,564,323	\$60,280,480
Contributions – employee	42,113,318	40,902,188	40,818,039	40,423,239	35,966,987
Net investment income	497,422,655	78,964,510	106,777,462	123,632,169	170,358,016
Benefit payments, including refunds of employee contributions	-160,290,898	-153,025,531	-144,296,719	-134,090,344	-126,479,801
Administrative expenses	-2,280,512	-2,268,390	-2,246,008	-1,720,253	-1,776,653
Other	247,032	594,069	298,872	248,855	443,113
Net change in Fiduciary Net Position	466,155,767	49,596,818	\$67,969,540	\$93,057,989	\$138,792,142
Plan Fiduciary Net Position – beginning	1,959,066,641	1,909,469,823	1,841,500,283	1,748,442,294	1,609,650,152
Plan Fiduciary Net Position – ending (b)	\$2,425,222,408	\$1,959,066,641	\$1,909,469,823	\$1,841,500,283	\$1,748,442,294
Net Pension Liability – ending: (a)-(b)	\$829,827,694	\$1,111,186,438	\$841,341,260	\$767,059,000	\$680,336,959
Plan's Fiduciary Net Position as a percentage of the Total Pension Liability	74.51%	63.81%	69.41%	70.59%	71.99%
Covered-employee payroll	\$551,981,002	\$527,571,033	\$521,670,606	\$504,553,289	\$471,268,111
Net Pension Liability as a percentage of covered-employee payroll	150.34%	210.62%	161.28%	152.03%	144.36%

Note: Covered-employee payroll reflects actual compensation amounts from the prior Plan year.

Section 2: Accounting Information

Exhibit 2 - Schedule of changes in Net Pension Liability – last ten fiscal years *(continued)*

	Year End June 30,				
	2016	2015	2014	2013*	2012*
Total Pension Liability					
Service cost	\$47,012,283	\$41,786,352	\$39,368,808		
Interest	171,562,804	164,404,550	156,634,668		
Differences between expected and actual experience	25,051,322	3,979,303	0		
Changes of assumptions	-21,853,404	62,246,999	0		
Changes of benefit terms	0	0	0		
Benefit payments, including refunds of employee contributions	-120,093,586	-111,396,184	-104,492,554		
Net change in Total Pension Liability	\$101,679,419	\$161,021,020	\$91,510,922		
Total Pension Liability – beginning	2,169,908,969	2,008,887,949	1,917,377,027		
Total Pension Liability – ending (a)	\$2,271,588,388	\$2,169,908,969	\$2,008,887,949		
Plan Fiduciary Net Position					
Contributions – employer	\$54,347,060	\$55,881,364	\$56,482,985		
Contributions – employee	34,055,217	33,296,248	31,745,692		
Net investment income	17,962,424	-8,484,694	203,721,748		
Benefit payments, including refunds of employee contributions	-120,093,586	-111,396,184	-104,492,554		
Administrative expenses	-1,468,605	-1,858,854	-1,158,183		
Other	-13,597	177,491	453,853		
Net change in Fiduciary Net Position	-\$15,211,087	-\$32,384,629	\$186,753,541		
Plan Fiduciary Net Position – beginning	1,624,861,239	1,657,245,868	1,470,492,327		
Plan Fiduciary Net Position – ending (b)	\$1,609,650,152	\$1,624,861,239	\$1,657,245,868		
Net Pension Liability – ending: (a)-(b)	\$661,938,236	\$545,047,730	\$351,642,087		
Plan's Fiduciary Net Position as a percentage of the Total Pension Liability	70.86%	74.88%	82.50%		
Covered-employee payroll	\$462,057,022	\$437,675,917	\$416,766,302		
Net Pension Liability as a percentage of covered-employee payroll	143.26%	124.53%	84.37%		

* Historical information prior to implementation of GASB 67/68 is not required.
 Note: Covered-employee payroll reflects actual compensation amounts from the prior Plan year.

Section 2: Accounting Information

Notes to Exhibit 2:

Changes in Assumptions: There have been no changes in actuarial assumptions since the last measurement date.

Changes in Plan Provisions: There have been no changes in plan provisions since the last measurement date.

Section 2: Accounting Information

Exhibit 3 - Schedule of contributions – last ten fiscal years

	Year End June 30				
	2021	2020	2019	2018	2017
Actuarially determined contribution	\$83,876,570	\$78,943,914	\$62,984,742	\$52,065,397	\$48,503,358
Contributions in relation to the actuarially determined contribution*	<u>88,944,172</u>	<u>84,429,972</u>	<u>66,617,894</u>	<u>64,564,323</u>	<u>60,280,480</u>
Contribution deficiency (excess)	-\$5,067,602	-\$5,486,058	-\$3,633,152	-\$12,498,926	-\$11,777,122
Covered-employee payroll	\$551,981,002	\$527,571,033	\$521,670,606	\$504,553,289	\$471,268,111
Contributions as a percentage of covered-employee payroll	16.11%	16.00%	12.77%	12.80%	12.79%
	2016	2015	2014	2013**	2012**
Actuarially determined contribution	\$46,237,853	\$44,651,783	\$40,217,666		
Contributions in relation to the actuarially determined contribution*	<u>54,347,060</u>	<u>55,881,364</u>	<u>56,482,985</u>		
Contribution deficiency (excess)	-\$8,109,207	-\$11,229,581	-\$16,265,319		
Covered-employee payroll	\$462,057,022	\$437,675,917	\$416,766,302		
Contributions as a percentage of covered-employee payroll	11.76%	12.77%	13.55%		

* Includes a portion of the contribution amount denoted as "other" in Exhibit 2.

** Historical information prior to implementation of GASB 67/68 is not required.

Note: Actuarially determined contributions for a given fiscal year are based on results from the June 30 actuarial valuation two years prior.

Section 2: Accounting Information

Notes to Exhibit 3:

Valuation date	Actuarially determined contribution for the year ending June 30, 2021, is based on results from the June 30, 2019, actuarial valuation, and was calculated as of June 30, with appropriate interest to the middle of the fiscal year.
Actuarial cost method	Entry Age Normal actuarial cost method
Amortization method	Amortization payments calculated to fully fund unfunded actuarial accrued liability with annual increases of 3% over a closed period.
Remaining amortization period	19 years as of July 1, 2019 The amortization of unfunded actuarial accrued liability (UAAL) within the actuarially determined contribution rate calculation is based on payments increasing at 3% per year required to amortize the UAAL over the 30-year closed period that began July 1, 2008.
Asset valuation method	The amount of the assets for valuation purposes equals the preliminary asset value plus 20% of the difference between market and preliminary asset values. The preliminary asset value is equal to the previous year's asset value (for valuation purposes) adjusted for contributions less benefit payments and expenses plus expected investment income. If necessary, a further adjustment is made to ensure that the valuation assets are within 20% of the market value.
Actuarial assumptions:	
Investment rate of return	7.50%, net of pension plan investment expenses, including inflation
Inflation rate	2.50%
Projected salary increases	Ranging from 3.50% to 7.04% based on service

Section 2: Accounting Information

Mortality

Pre-Retirement:

Groups A/F – 101% of RP-2006 blended 30% Blue Collar Employee, 70% Healthy Employee with generational projection using Scale SSA-2017

Group C – RP-2006 Blue Collar Employee with generational projection using Scale SSA-2017

Group D* – RP-2006 Healthy Employee with generational projection using Scale SSA-2017

** 30% of deaths are assumed to be accidental*

Healthy Post-Retirement:

Groups A/F – 101% of RP-2006 blended 30% Blue Collar Annuitant, 70% Healthy Annuitant with generational projection using Scale SSA-2017

Group C – RP-2006 Blue Collar Annuitant with generational projection using Scale SSA-2017

Group D – RP-2006 Healthy Annuitant with generational projection using Scale SSA-2017

Disabled Post-retirement:

RP-2006 Disabled Mortality Table with generational projection using scale SSA-2017

The tables with the generational projection to the ages of members as of the measurement date reasonably reflect the mortality experience of the System as of the measurement date.

The mortality rates were based on historical and current demographic data, adjusted to reflect health characteristics of the underlying groups and estimated future experience and professional judgment. The mortality tables were then adjusted to future years using the generational projection to reflect future mortality improvement between the measurement date and those years.

Other assumptions

Same as those used in the June 30, 2019, funding actuarial valuation.

Section 2: Accounting Information

Section 3: Supplemental Information

Exhibit I: Actuarial Assumptions and Actuarial Cost Method

Rationale for Assumptions:	The information and analysis used in selecting each assumption that has a significant effect on this actuarial valuation is shown in the Actuarial Experience Study dated September 24, 2020 (as prepared by Segal).																				
Roll-forward Techniques:	The results as of June 30, 2021, are based on the results of the Vermont State Employees' Retirement System Actuarial Valuation Report as of June 30, 2020, adjusted forward, using standard actuarial techniques.																				
Inflation:	2.30%.																				
Investment Return:	7.00%. The investment return assumption is a long-term estimate derived from historical data, current and recent market expectations, and professional judgment. As part of the analysis, a building block approach was used that reflects inflation expectations and anticipated risk premiums for each of the portfolio's asset classes, as well as the Plan's target asset allocation.																				
Salary Increases:	<table><thead><tr><th>Service</th><th>Annual Rate of Salary Increase %</th></tr></thead><tbody><tr><td>0</td><td>5.55%</td></tr><tr><td>5</td><td>5.31%</td></tr><tr><td>10</td><td>4.77%</td></tr><tr><td>15</td><td>4.42%</td></tr><tr><td>20</td><td>4.20%</td></tr><tr><td>25</td><td>3.99%</td></tr><tr><td>30</td><td>3.82%</td></tr><tr><td>35</td><td>3.62%</td></tr><tr><td>40+</td><td>3.40%</td></tr></tbody></table>	Service	Annual Rate of Salary Increase %	0	5.55%	5	5.31%	10	4.77%	15	4.42%	20	4.20%	25	3.99%	30	3.82%	35	3.62%	40+	3.40%
Service	Annual Rate of Salary Increase %																				
0	5.55%																				
5	5.31%																				
10	4.77%																				
15	4.42%																				
20	4.20%																				
25	3.99%																				
30	3.82%																				
35	3.62%																				
40+	3.40%																				

Section 3: Supplemental Information

Cost-of-Living Adjustments:

Assumed to occur at the rate of 2.40% per annum for Groups A, C and D members and 1.35% per annum for Group F members (beginning at age 62 for deferred retirements) who retired before July 1, 2008. For Group F members retiring after July 1, 2008, cost-of-living adjustments are assumed to occur at the rate of 2.40% per annum (beginning at age 65 for deferred retirements). The January 1, 2021 and January 1, 2022 COLAs are 0.00% and 4.60%, respectively, for Groups A, C, and D members and for Group F members who retired after July 1, 2008, and 1.00% and 2.30%, respectively, for all other Group F members.

Mortality Rates:

Pre-Retirement:

- Groups A/F 60% of PubG-2010 General Employee Amount-Weighted Above Median, 40% of PubG-2010 General Employee Amount-Weighted with generational projection using scale MP-2019
- Group C PubS-2010 Public Safety Employee Amount-Weighted with generational projection using scale MP-2019
- Group D* 70% of PubG-2010 General Employee Amount-Weighted Above Median, 30% of PubG-2010 General Employee with generational projection using scale MP-2019

Healthy Post-Retirement - Retirees:

- Groups A/F 109% of PubG-2010 General Healthy Retiree Amount-Weighted with generational projection using scale MP-2019
- Group C 40% of PubS-2010 Public Safety Retiree Amount-Weighted Above Median, 60% of PubS-2010 Public Safety Retiree Amount-Weighted with generational projection using scale MP-2019
- Group D PubG-2010 General Healthy Retiree Amount-Weighted Above Median with generational projection using scale MP-2019

Healthy Post-Retirement - Beneficiaries:

- Groups A/F Pub-2010 Contingent Survivor Amount-Weighted with generational projection using MP-2019
- Group C 40% of Pub-2010 Contingent Survivor Amount-Weighted Above Median, 60% of Pub-2010 Contingent Survivor Amount-Weighted with generational projection using MP-2019
- Group D Pub-2010 Contingent Survivor Amount-Weighted Above Median with generational projection using MP-2019

Disabled Post-Retirement:

- All Groups PubNS-2010 Non-Safety Disabled Retiree Amount-Weighted Mortality Table with generational projection using scale MP-2019

The tables with the generational projection to the ages of members as of the measurement date reasonably reflect the mortality experience of the System as of the measurement date.

The mortality rates were based on historical and current demographic data, adjusted to reflect health characteristics of the underlying groups and estimated future experience and professional judgment. The mortality tables were then adjusted to future years using the generational projection to reflect future mortality improvement between the measurement date and those years.

* 30% of deaths are assumed to be accidental.

Section 3: Supplemental Information

Separation from Service before Retirement (Due to Withdrawal and Disability):

Representative values of the assumed annual rates of withdrawal and disability are as follows:

Rate (%)						
Withdrawal Groups A/D ¹				Disability ²		
Ultimate Rates		Increase Factors				
Age	Male/Female	Service	Male/Female	Age	Groups A/D/F	Group C
25	4.9066%	1	4.000	25	0.0158%	0.0770%
30	3.9275%	3	2.500	30	0.0204%	0.0990%
35	3.2826%	5	1.900	35	0.0272%	0.1325%
40	3.0392%	7	1.600	40	0.0406%	0.1980%
45	2.6920%	9	1.300	45	0.0665%	0.3235%
50	2.2464%			50	0.1055%	0.5455%
55	1.8346%			55	0.1862%	0.9080%
60	3.9019%			60	0.3005%	1.4640%

¹ 20% of disability incidents are assumed to be accidental for Group C and 10% of disability incidents are assumed to be accidental for all other members.

² The Ultimate Rates are multiplied by the Increase Factors during the first 10 years of service.

Withdrawal Group C		
Service	Male	Female
0	10.800%	21.600%
1	6.480%	12.960%
2	5.400%	10.800%
3	3.456%	6.912%
4	3.456%	6.912%
5	3.456%	6.912%
6-19	3.240%	6.480%
20+	0.000%	0.000%

Section 3: Supplemental Information

Separation from Service before Retirement (Due to Withdrawal and Disability) (continued):

Withdrawal Group F ¹					
Ultimate Rates 0-10 Years of Service		Increase Factors		Ultimate Rates ² 10-30 Years of Service	
Age	Male/Female	Service	Male/Female	Age	Male/Female
25	6.3933%	0	2.850	25	4.2200%
30	5.1207%	2	2.300	30	3.3800%
35	4.2723%	4	1.550	35	2.8200%
40	3.9542%	6	1.300	40	2.6100%
45	3.5148%	8	1.150	45	2.3200%
50	2.9240%			50	1.9300%
55	2.4695%			55	1.6300%
60	2.4695%			60	1.6300%

¹ The Ultimate Rates are multiplied by the Increase Factors during the first 10 years of service.

² Withdrawal Rates are 0.00% for all Group F members with 30+ years of service

Retirement Rates:

Retirement Group F ³					
Age	Male	Female	Age	Male	Female
40-52	20.00%	10.00%	63	17.50%	15.00%
53	15.00%	10.00%	64	20.00%	15.00%
54	15.00%	10.00%	65	22.50%	20.00%
55	5.00%	5.00%	66	25.00%	30.00%
56	5.00%	5.00%	67	25.00%	30.00%
57	5.00%	5.00%	68	25.00%	30.00%
58	5.00%	7.50%	69	25.00%	30.00%
59	7.50%	7.50%	70+	100.00%	100.00%
60	7.50%	7.50%			
61	15.00%	12.50%			
62	25.00%	25.00%			

³ All Group A, C, and D members are assumed to retire when first eligible.

Section 3: Supplemental Information

Inactive Members as Reported by the System:	<p>Not Vested: Valuation liability equals 100% of accumulated contributions.</p> <p>Vested: Valuation liability based on accrued benefit and 20% of members are assumed to retire from Early Retirement Age for each year until Normal Retirement Age, then 100% of members are assumed to retire at their Normal Retirement Age with a deferred vested benefit.</p>
Deferred Members as Reported by the System:	Valuation liability based on accrued benefit and 20% of members are assumed to retire from Early Retirement Age for each year until Normal Retirement Age, then 100% of members are assumed to retire at their Normal Retirement Age with a deferred vested benefit.
Unknown Data for Members:	Same as those exhibited by members with similar known characteristics. If not specified, members are assumed to be male.
Percent Married:	<p>Groups A/D: 75.4% of male members and 64.0% of female members are assumed to be married.</p> <p>Group C: 73.3% of male members and 61.0% of female members are assumed to be married.</p> <p>Group F: 71.4% of male members and 63.1% of female members are assumed to be married.</p>
Age of Spouse:	Females three years younger than males.
Benefit Elections:	<p>Non-Group C: All members are assumed to elect the single life annuity.</p> <p>Group C: Single members are assumed to elect the single life annuity. Married members are assumed to elect the 70% joint & survivor option.</p>
Actuarial Cost Method:	Entry Age Actuarial Cost Method. Entry Age is the age at date of employment or, if date is unknown, current age minus years of service. Normal Cost and Actuarial Accrued Liability are calculated on an individual basis and are allocated by salary, with Normal Cost determined using the plan of benefits applicable to each participant.
Modeling:	Segal valuation results are based on proprietary actuarial modeling software. The actuarial valuation models generate a comprehensive set of liability and cost calculations that are presented to meet regulatory, legislative and client requirements. Deterministic cost projections are based on a proprietary forecasting model. Our Actuarial Technology and Systems unit, comprised of both actuaries and programmers, is responsible for the initial development and maintenance of these models. The models have a modular structure that allows for a high degree of accuracy, flexibility and user control. The client team programs the assumptions and the plan provisions, validates the models, and reviews test lives and results, under the direction of the supervising actuary.
Changes in Actuarial Assumptions:	There were no changes in actuarial assumptions since the last valuation.

Section 3: Supplemental Information

Exhibit II: Summary of Plan Provisions

This exhibit summarizes the major provisions of the Plan included in the valuation. It is not intended to be, nor should it be interpreted as, a complete statement of all plan provisions.

Effective Date:	July 1, 1972 (for consolidated system).
Credible Service:	Service as a member plus purchased service.
Average Final Compensation (AFC):	<ul style="list-style-type: none"> • Groups A/F: Average annual compensation during highest 3 consecutive years. • Group C: Average annual compensation during highest 2 consecutive years. • Group D: Annual compensation at retirement.
Normal Retirement – Eligibility:	<ul style="list-style-type: none"> • Group A: Earlier of age 65 with 5 years of service for members hired after July 1, 2004, and age 62 with 20 years of service. • Group C: Age 55. • Group D: Age 62 with 5 years of service. • Group F: Age 62 or 30 years of service. For members hired after June 30, 2008, age 65 or a sum of age plus service greater than or equal to 87
Normal Retirement – Amount:	<ul style="list-style-type: none"> • Group A: 1.67% of AFC times service. • Group C: 2.50% of AFC times service up to 20 years. • Group D: 3.33% of AFC times service up to 30 years. • Group F: 1.25% of AFC times service prior to January 1, 1991, plus 1.67% of AFC times service after 1990, up to a maximum benefit of 50% of AFC. For members hired on or after July 1, 2008, the maximum benefit is 60% of AFC.
Early Retirement – Eligibility:	<ul style="list-style-type: none"> • Groups A/D: Age 55 with 5 years of service or 30 years of service. • Group C: Age 50 with 20 years of service. • Group F: Age 55 with 5 years of service.

Section 3: Supplemental Information

Early Retirement – Amount:

- Group A: Actuarial equivalent of normal retirement allowance. For members with 30 years of service, there is no reduction.
- Group C: Same as normal retirement allowance.
- Group D: Normal allowance reduced by 3% for each year commencement precedes age 62.
- Group F: For members hired prior to July 1, 2008, no reduction if 30 years of service; otherwise normal allowance reduced by 6% for each year commencement precedes age 62. For members hired on or after July 1, 2008, no reduction if combination of years and service equal 87; other reduced from age 65 based on the following table:

Years of Service	Reduction in Benefit
35	One-eighth of 1% per month
30	One-fourth of 1% per month
25	One-third of 1% per month
20	Five-twelfths of 1% per month
Less than 20	Five-ninths of 1% per month

Vesting:

All groups – 5 years of creditable service. Allowance beginning at normal retirement age based on AFC and service at termination.

Ordinary Disability – Eligibility:

All groups – 5 years of service and incapacitated, not work related, for performance of duty.

Ordinary Disability – Amount:

All groups – Immediate allowance based on service to date of disability. Benefit is the greatest of 25% of AFC and unreduced accrued benefit as of date of disability.

Accidental Disability – Eligibility:

All groups – Incapacitated because of work related accident.

Accidental Disability – Amount:

- Groups A/D/F: Immediate allowance based on service projected to normal retirement. Benefit is the greater of 25% of AFC and unreduced accrued benefit as of date of disability.
- Group C: Immediate allowance equal to 50% of AFC with additional 10% of AFC for each dependent child (up to 30%).

Section 3: Supplemental Information

Ordinary Death – Eligibility:	<ul style="list-style-type: none"> • Groups A/F: Death after eligibility for early retirement or 10 years of service. • Groups C/D: Death after normal retirement age or 10 years of service.
Ordinary Death – Amount:	<ul style="list-style-type: none"> • Groups A/D/F: Maximum of reduced allowance under 100% survivor option and disability allowance under 100% disability survivor option, commencing immediately. • Group C: 70% of the allowance that would have been payable to the member plus additional allowance equal to 10% of AFC for each dependent child (up to 30%).
Accidental Death – Eligibility:	All groups – Death because of work related accident.
Accidental Death – Amount:	<ul style="list-style-type: none"> • Groups A/D/F: Allowance equal to 25% of AFC payable to spouse. • Group C: Allowance equal to 35% of AFC payable to spouse plus 10% for each dependent child (up to 30%).
Post-Retirement Adjustments:	<ul style="list-style-type: none"> • Groups A/C/D: Allowances in payment for at least one year increased on each January 1 by the percentage increase in Consumer Price Index, but not more than 5%. • Group F: Same, but increase is based on half of the Consumer Price Index increase. Increase is based on the full Consumer Price Index increase starting in 2014 for employees retiring after July 1, 2008.
Optional Benefit and Death after Retirement:	Lifetime allowance or actuarially equivalent allowance with survivor benefit as elected by member upon retirement. Upon death of a Group C member, an allowance equal to 70% of the member's allowance is continue to the surviving spouse.
Refund of Contributions:	Upon termination, if the member so elects, or if no other benefit is payable, the member's accumulated contributions with interest are refunded.
Member Contribution Rates:	<ul style="list-style-type: none"> • Groups A/D/F: 6.65%. • Group C: 8.53%.
Changes in Plan Provisions:	There have been no changes in plan provisions since the last valuation.

Appendix: Definition of Terms

Definitions of certain terms as they are used in Statements 67/68. The terms may have different meanings in other contexts.

Active Employees:	Individuals employed at the end of the reporting or measurement period, as applicable.
Actual Contributions:	Cash contributions recognized as additions to a pension Plan Fiduciary Net Position.
Actuarial Present Value of Projected Benefit Payments:	Projected benefit payments discounted to reflect the expected effects of the time value (present value) of money and the probabilities of payment.
Actuarial Valuation:	The determination, as of a point in time (the actuarial valuation date), of the service cost, Total Pension Liability, and related actuarial present value of projected benefit payments for pensions performed in conformity with Actuarial Standards of Practice unless otherwise specified by the GASB.
Actuarial Valuation Date:	The date as of which an actuarial valuation is performed.
Actuarially Determined Contribution:	A target or recommended contribution to a defined benefit pension plan for the reporting period, determined in conformity with Actuarial Standards of Practice based on the most recent measurement available when the contribution for the reporting period was adopted.
Ad Hoc Cost-of-Living Adjustments (Ad Hoc COLAs):	Cost-of-living adjustments that require a decision to grant by the authority responsible for making such decisions.
Ad Hoc Postemployment Benefit Changes:	Postemployment benefit changes that require a decision to grant by the authority responsible for making such decisions.
Agent Employer:	An employer whose employees are provided with pensions through an agent multiple-employer defined benefit pension plan.
Agent Multiple-Employer Defined Benefit Pension Plan (Agent Pension Plan):	A multiple-employer defined benefit pension plan in which pension plan assets are pooled for investment purposes but separate accounts are maintained for each individual employer so that each employer's share of the pooled assets is legally available to pay the benefits of only its employees.
Allocated Insurance Contract:	A contract with an insurance company under which related payments to the insurance company are currently used to purchase immediate or deferred annuities for individual employees. Also may be referred to as an annuity contract.

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Automatic Cost-of-Living Adjustments (Automatic COLAs):	Cost-of-living adjustments that occur without a requirement for a decision to grant by a responsible authority, including those for which the amounts are determined by reference to a specified experience factor (such as the earnings experience of the pension plan) or to another variable (such as an increase in the consumer price index).
Automatic Postemployment Benefit Changes:	Postemployment benefit changes that occur without a requirement for a decision to grant by a responsible authority, including those for which the amounts are determined by reference to a specified experience factor (such as the earnings experience of the pension plan) or to another variable (such as an increase in the consumer price index).
Closed Period:	A specific number of years that is counted from one date and declines to zero with the passage of time. For example, if the recognition period initially is five years on a closed basis, four years remain after the first year, three years after the second year, and so forth.
Collective Deferred Outflows of Resources and Deferred Inflows of Resources Related to Pensions:	Deferred outflows of resources and deferred inflows of resources related to pensions arising from certain changes in the collective Net Pension Liability.
Collective Net Pension Liability:	The Net Pension Liability for benefits provided through (1) a cost-sharing pension plan or (2) a single-employer or agent pension plan in circumstances in which there is a special funding situation.
Collective Pension Expense:	Pension expense arising from certain changes in the collective Net Pension Liability.
Contributions:	Additions to a pension plan's Fiduciary Net Position for amounts from employers, nonemployer contributing entities (for example, state government contributions to a local government pension plan), or employees. Contributions can result from cash receipts by the pension plan or from recognition by the pension plan of a receivable from one of these sources.
Cost-of-Living Adjustments:	Postemployment benefit changes intended to adjust benefit payments for the effects of inflation.
Cost-Sharing Employer:	An employer whose employees are provided with pensions through a cost-sharing multiple-employer defined benefit pension plan.
Cost-Sharing Multiple-Employer Defined Benefit Pension Plan (Cost-Sharing Pension Plan):	A multiple-employer defined benefit pension plan in which the pension obligations to the employees of more than one employer are pooled and pension plan assets can be used to pay the benefits of the employees of any employer that provides pensions through the pension plan.
Covered-Employee Payroll:	The payroll of employees that are provided with pensions through the pension plan.

Appendix: Definition of Terms

Deferred Retirement Option Program (DROP):	A program that permits an employee to elect a calculation of benefit payments based on service credits and salary, as applicable, as of the DROP entry date. The employee continues to provide service to the employer and is paid for that service by the employer after the DROP entry date; however, the pensions that would have been paid to the employee (if the employee had retired and not entered the DROP) are credited to an individual employee account within the defined benefit pension plan until the end of the DROP period.
Defined Benefit Pension Plans:	Pension plans that are used to provide defined benefit pensions.
Defined Benefit Pensions:	Pensions for which the income or other benefits that the employee will receive at or after separation from employment are defined by the benefit terms. The pensions may be stated as a specified dollar amount or as an amount that is calculated based on one or more factors such as age, years of service, and compensation. (A pension that does not meet the criteria of a defined contribution pension is classified as a defined benefit pension for purposes of Statement 68.)
Defined Contribution Pension Plans:	Pension plans that are used to provide defined contribution pensions.
Defined Contribution Pensions:	Pensions having terms that (1) provide an individual account for each employee; (2) define the contributions that an employer is required to make (or the credits that it is required to provide) to an active employee's account for periods in which that employee renders service; and (3) provide that the pensions an employee will receive will depend only on the contributions (or credits) to the employee's account, actual earnings on investments of those contributions (or credits), and the effects of forfeitures of contributions (or credits) made for other employees, as well as pension plan administrative costs, that are allocated to the employee's account.
Discount Rate:	The single rate of return that, when applied to all projected benefit payments, results in an actuarial present value of projected benefit payments equal to the total of the following: <ol style="list-style-type: none">1. The actuarial present value of benefit payments projected to be made in future periods in which (a) the amount of the pension Plan Fiduciary Net Position is projected (under the requirements of Statement 68) to be greater than the benefit payments that are projected to be made in that period and (b) pension plan assets up to that point are expected to be invested using a strategy to achieve the long-term expected rate of return, calculated using the long-term expected rate of return on pension plan investments.2. The actuarial present value of projected benefit payments not included in (1), calculated using the municipal bond rate.

Appendix: Definition of Terms

Entry Age Actuarial Cost Method:	A method under which the actuarial present value of the projected benefits of each individual included in an actuarial valuation is allocated on a level basis over the earnings or service of the individual between entry age and assumed exit age(s). The portion of this actuarial present value allocated to a valuation year is called the normal cost. The portion of this actuarial present value not provided for at a valuation date by the actuarial present value of future normal costs is called the actuarial accrued liability.
Inactive Employees:	Terminated individuals that have accumulated benefits but are not yet receiving them, and retirees or their beneficiaries currently receiving benefits.
Measurement Period:	The period between the prior and the current measurement dates.
Multiple-Employer Defined Benefit Pension Plan:	A defined benefit pension plan that is used to provide pensions to the employees of more than one employer.
Net Pension Liability (NPL):	The liability of employers and non-employer contributing entities to employees for benefits provided through a defined benefit pension plan.
Non-Employer Contributing Entities:	Entities that make contributions to a pension plan that is used to provide pensions to the employees of other entities. For purposes of Statements 67/68, employees are not considered non-employer contributing entities.
Other Postemployment Benefits:	All postemployment benefits other than retirement income (such as death benefits, life insurance, disability, and long-term care) that are provided separately from a pension plan, as well as postemployment healthcare benefits, regardless of the manner in which they are provided. Other postemployment benefits do not include termination benefits.
Pension Plans:	Arrangements through which pensions are determined, assets dedicated for pensions are accumulated and managed and benefits are paid as they come due.
Pensions:	Retirement income and, if provided through a pension plan, postemployment benefits other than retirement income (such as death benefits, life insurance, and disability benefits). Pensions do not include postemployment healthcare benefits and termination benefits.
Plan Members:	Individuals that are covered under the terms of a pension plan. Plan members generally include (1) employees in active service (active plan members) and (2) terminated employees who have accumulated benefits but are not yet receiving them and retirees or their beneficiaries currently receiving benefits (inactive plan members).
Postemployment:	The period after employment.
Postemployment Benefit Changes:	Adjustments to the pension of an inactive employee.
Postemployment Healthcare Benefits:	Medical, dental, vision, and other health-related benefits paid subsequent to the termination of employment.

Appendix: Definition of Terms

Projected Benefit Payments:	All benefits estimated to be payable through the pension plan to current active and inactive employees as a result of their past service and their expected future service.
Public Employee Retirement System:	A special-purpose government that administers one or more pension plans; also may administer other types of employee benefit plans, including postemployment healthcare plans and deferred compensation plans.
Real Rate of Return:	The rate of return on an investment after adjustment to eliminate inflation.
Service Costs:	The portions of the actuarial present value of projected benefit payments that are attributed to valuation years.
Single Employer:	An employer whose employees are provided with pensions through a single-employer defined benefit pension plan.
Single-Employer Defined Benefit Pension Plan (Single-Employer Pension Plan):	A defined benefit pension plan that is used to provide pensions to employees of only one employer.
Special Funding Situations:	<p>Circumstances in which a non-employer entity is legally responsible for making contributions directly to a pension plan that is used to provide pensions to the employees of another entity or entities and either of the following conditions exists:</p> <ol style="list-style-type: none">1. The amount of contributions for which the non-employer entity legally is responsible is <i>not</i> dependent upon one or more events or circumstances unrelated to the pensions.2. The non-employer entity is the only entity with a legal obligation to make contributions directly to a pension plan.
Termination Benefits:	Inducements offered by employers to active employees to hasten the termination of services, or payments made in consequence of the early termination of services. Termination benefits include early-retirement incentives, severance benefits, and other termination-related benefits.
Total Pension Liability (TPL):	The portion of the actuarial present value of projected benefit payments that is attributed to past periods of employee service in conformity with the requirements of Statement.

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