

WASHINGTON STATE

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# 2017 Actuarial Valuation

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August • 2018



Office of the  
State Actuary

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To obtain a copy of this report in alternative format call 360.786.6140 or for TDD 711.



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# Office of the State Actuary

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## Letter of Introduction Actuarial Valuation Report As of June 30, 2017

August 2018

As required under [Chapter 41.45 RCW](#), this report documents the results of an actuarial valuation of the following Washington State retirement systems.

- ❖ Public Employees’ Retirement System (PERS).
- ❖ Teachers’ Retirement System (TRS).
- ❖ School Employees’ Retirement System (SERS).
- ❖ Public Safety Employees’ Retirement System (PSERS).
- ❖ Law Enforcement Officers’ and Fire Fighters’ Retirement System (LEOFF).
- ❖ Washington State Patrol Retirement System (WSPRS).

The primary purpose of this valuation is to determine contribution requirements for the systems listed above for the 2019-21 Biennium based on a June 30, 2017, measurement date and under the funding policy established by the Legislature. This valuation also provides information on the funding progress and developments in the plans over the past year.

This report is organized in the following four sections.

- ❖ Summary of Key Results.
- ❖ Actuarial Exhibits.
- ❖ Participant Data.
- ❖ Appendices.

The [Summary of Key Results](#) section provides a high-level summary of the valuation results for all systems combined. The next two sections of the report provide detailed actuarial asset and liability information and participant data for each system and plan separately. The



[Appendices](#) provide access to a summary of the principal actuarial assumptions and methods, a summary of the major plan provisions, and additional information used to prepare this valuation.

We encourage you to submit any questions you might have concerning this report to our mailing address or our e-mail address at [state.actuary@leg.wa.gov](mailto:state.actuary@leg.wa.gov). We also invite you to visit our website ([leg.wa.gov/osa](http://leg.wa.gov/osa)), for further information regarding the actuarial funding of the Washington State retirement systems.

Matthew M. Smith, FCA, EA, MAAA  
State Actuary

Luke Masselink, ASA, EA, MAAA  
Senior Actuary



# I. SUMMARY OF KEY RESULTS





## Intended Use

The purpose of this report is to develop contribution rates required to fund the Washington State retirement systems for the 2019-21 Biennium based on a June 30, 2017, measurement date and based on the funding policy described in this section. This report provides information on the contribution rates, funding progress, and developments in the plans over the past year. This report also discloses the data, assumptions, and methods we used to develop the contribution rates. This report is not intended to satisfy the accounting requirements under the Governmental Accounting Standards Board (GASB) rules.

Similarly, this actuarial valuation is not intended to report on the overall health or financial condition of the pension system. Such information can be found in the [2017 Report on Financial Condition](#) (RFC), which the Office of the State Actuary (OSA) issues every two years. The key measures we use in the RFC to assess the health of a pension plan include funding level, adequacy and affordability of contributions, and risk.

## Contribution Rates

Calculated Contribution Rates				
	Plan 1		Plans 2/3	
	2017	2016	2017	2016
<b>PERS</b>				
Member*	6.00%	6.00%	7.90%	8.34%
Total Employer	12.68%	13.50%	12.68%	13.50%
<b>TRS</b>				
Member*	6.00%	6.00%	7.77%	7.98%
Total Employer	15.33%	16.18%	15.33%	16.18%
<b>SERS</b>				
Member*	N/A	N/A	8.25%	8.46%
Total Employer	N/A	N/A	13.01%	14.51%
<b>PSERS</b>				
Member	N/A	N/A	7.20%	6.98%
Total Employer	N/A	N/A	11.96%	12.03%
<b>LEOFF</b>				
Member	0.00%	0.00%	8.59%	7.91%
Employer	0.00%	0.00%	5.15%	4.75%
State	0.00%	0.00%	3.44%	3.16%
<b>WSPRS</b>				
Member	8.45%	7.68%	8.45%	7.68%
Employer (State)	22.13%	24.86%	22.13%	24.86%

*Employer rates exclude administrative expense rate.*

*\*Plan 3 members do not contribute to the defined benefit plan.*

We determine the member and employer contribution rates as a percentage of salary. The summary table to the left shows contribution rates based on the 2017 valuation along with rates from the previous valuation. Throughout this report, we reconcile how plan experience compared to our assumptions over the valuation year. In doing so, we compare the contribution rates calculated under this valuation against those rates calculated under the 2016 valuation. Please note, however, that the contribution rates expressed for the 2016 valuation were not collected, as that was not a rate-setting year under the current contribution rate-setting cycle. The [Actuarial Exhibits](#) section of this report shows how we developed the contribution rates for 2017.

No member or employer/state contributions are required for the Law Enforcement Officers' and Fire Fighters' Retirement System (LEOFF) Plan 1 when the plan remains fully funded. See [RCW 41.26.080\(2\)](#).

Minimum employer contribution rates adopted by the Legislature for the Public Employees' Retirement System (PERS) Plan 1 and the Teachers' Retirement System (TRS) Plan 1 became effective at the beginning of the 2015-17 Biennium. Employer contribution rates for PERS 1 and TRS 1 in the table to the left remain above the minimums.

In addition to calculating contribution rates in this report, we also estimate contribution rates for future biennia based upon projected assets and liabilities. These projected rates can be found on our [website](#), but please note that these rates are subject to change based on modifications to plan provisions, assumptions, and the actuarial experience of the systems.

## Contribution Rate-Setting Cycle

Under current Washington State law, in July of even-numbered years, the Pension Funding Council (PFC) reviews the basic contribution rates calculated by OSA based on an actuarial valuation performed on asset, participant, and plan information compiled in odd-numbered years. In calculating basic contribution rates, OSA applies the statutory funding policies described in this section.

The PFC may adopt changes to contribution rates by an affirmative vote of at least four members. The basic rates adopted

## I. SUMMARY OF KEY RESULTS

by the PFC will remain in place for the ensuing biennium, subject to revision by the Legislature. The LEOFF 2 Board performs these duties for LEOFF 2 under the same cycle.

[RCW 41.45.070](#) requires that a temporary and supplemental contribution rate increase be charged to fund the cost of benefit enhancements enacted following the adoption of the basic rates. Supplemental contribution rates are included in the basic rates at the beginning of the next contribution rate-setting cycle.

For reference, the table to the right compares the member and total employer contribution rates that were adopted by the PFC against the rates that were calculated by OSA.

### Funding Policy

Washington State relies on systematic actuarial funding to finance the on-going cost of the state retirement systems. Under this financing approach, we reduce the cost of future pension payments by the expected long-term return on invested contributions.

The state's funding policy is found in [Chapter 41.45 RCW](#) — Actuarial Funding of State Retirement Systems. It includes the following goals:

- Provide a dependable and systematic process for funding the benefits to members and retirees of the Washington State retirement systems.
- Fully fund the retirement system Plans 2 and 3, and Washington State Patrol Retirement System (WSPRS), as provided by law.
- Fully amortize the total cost of LEOFF Plan 1 not later than June 30, 2024.
- Fully amortize the Unfunded Actuarial Accrued Liability (UAAL) in PERS Plan 1 and TRS Plan 1 within a rolling ten-year period using methods and assumptions that balance needs for increased benefit security, decreased contribution rate volatility, and affordability of pension contribution rates.
- Establish long-term employer contribution rates that will remain a relatively predictable proportion of future state budgets.
- Fund, to the extent feasible, all benefits for Plans 2 and 3 members over the working lives of those members so that the taxpayers who receive the benefit of those members' service pay the cost of those benefits.

Based on the funding policy, the same contribution rate is charged to employers within each system regardless of the plan in which employees hold membership (except for LEOFF). In addition, all benefit increases that become effective after June 30, 2009, for PERS Plan 1 and TRS Plan 1 members, are funded over a fixed ten-year period.

If all actuarial assumptions are realized and all future contributions required under this funding policy are made, we expect the funding policy to accumulate sufficient assets to provide for all future benefits for current members when due.

The Washington State Investment Board (WSIB) directs the investment of retirement system contributions. [RCW 43.33A.110](#) requires WSIB to maximize investment returns at a prudent level of risk.

2019-21 Contribution Rates		
	Calculated	Adopted
<b>PERS 1</b>		
Member	6.00%	6.00%
Total Employer	12.68%	12.68%
<b>PERS 2/3</b>		
Member*	7.90%	7.90%
Total Employer	12.68%	12.68%
<b>TRS 1</b>		
Member	6.00%	6.00%
Total Employer	15.33%	15.33%
<b>TRS 2/3</b>		
Member*	7.77%	7.77%
Total Employer	15.33%	15.33%
<b>SERS 2/3</b>		
Member*	8.25%	8.25%
Total Employer	13.01%	13.01%
<b>PSERS 2</b>		
Member	7.20%	7.20%
Total Employer	11.96%	11.96%
<b>LEOFF 1</b>		
Member	0.00%	0.00%
Employer	0.00%	0.00%
State	0.00%	0.00%
<b>LEOFF 2**</b>		
Member	8.59%	8.59%
Employer	5.15%	5.15%
State	3.44%	3.44%
<b>WSPRS 1/2</b>		
Member	8.45%	8.45%
Employer (State)	22.13%	22.13%

*Employer rates exclude administrative expense rate.*

*\*Plan 3 members do not contribute to the defined benefit plan.*

*\*\*The LEOFF 2 Board adopts contribution rates for LEOFF 2.*

## Comments on 2017 Results

Many factors can influence how actuarial valuation results change from one measurement date to the next. Those factors include changes in the covered population, changes in plan provisions, assumptions and methods, and experience that varies from our expectations.

For this valuation, we changed our economic assumptions, consistent with the assumptions adopted by the PFC and the LEOFF 2 Board.

- We lowered the valuation interest rate from 7.70 percent to 7.50 percent for all systems except LEOFF 2. For LEOFF 2, we lowered the valuation interest rate from 7.50 percent to 7.40 percent.
- We lowered assumed general salary growth from 3.75 percent to 3.50 percent for all systems.
- We lowered assumed inflation from 3.00 percent to 2.75 percent for all systems.

These assumption changes, along with above-expected investment returns over the valuation year, led most plans to experience a higher funded status and lower calculated contribution rates than we reported in the last valuation.

While we made no significant changes to our actuarial methods, there were a number of plan provision changes. These included the implementation of an ad-hoc COLA increase for Plan 1 annuitants in PERS and TRS, a change of membership in PSERS, and the addition of Post-Traumatic Stress Disorder to the list of occupational diseases for LEOFF. See the [Summary of Plan Provisions](#) section of this report for more details.

In July 2018, the LEOFF 2 Board also adopted a new funding policy which raises the LEOFF 2 minimum normal cost rates from 90 percent of the Entry Age Normal Cost (EANC) to 100 percent of the EANC. This policy change is reflected in the calculated rates for this report.

In terms of annual plan experience, the actual rate of investment return on the Market Value of Assets (MVA) was 13.44 percent, which was above the assumed rate. The rate of investment return on the Actuarial (or smoothed) Value of Assets (AVA) was 9.17 percent, which was also higher than expected for the valuation year. Salaries for the PERS plans, TRS 2/3, and LEOFF 2 grew less than expected, while salaries for all other plans grew more than expected. With regard to the covered population, the most significant change we observed occurred in WSPRS Plan 2, whose active population increased by approximately 16 percent over the valuation year.

Detailed gain and loss information by system can be found in the [Actuarial Exhibits](#) section of this report. Please see the [Actuarial Certification Letter](#) for additional comments on the valuation results.

## Actuarial Liabilities

The next table summarizes key measures of actuarial liability along with the liabilities from last year's valuation. The Future Value of Fully Projected Benefits represents the total expected value of all future benefit payments for all members of all systems as of the valuation date. The Present Value of Fully Projected Benefits represents today's value of the Future Value of Fully Projected Benefits when we discount future benefit payments with the valuation interest rate. In other words, if we invest the Present Value of Fully Projected Benefits as a lump sum amount at the valuation date and earn the valuation interest rate each year, we expect there would be enough money to pay all expected future benefit payments for current members.

The Actuarial Accrued Liability identifies the portion of the present value of future benefits that has been accrued as of the valuation date based on the Entry Age Normal (EAN) actuarial cost method.

Actuarial Liabilities		
(Dollars in Millions)	2017	2016
<b>All Systems</b>		
Future Value of Fully Projected Benefits	\$655,649	\$658,821
Present Value of Fully Projected Benefits	110,871	105,250
Actuarial Accrued Liability*	\$92,791	\$88,170
Valuation Interest Rate**	7.50%	7.70%

\*Calculated using Entry Age Normal (EAN) cost method.

\*\*7.40% in LEOFF 2.

See the [Actuarial Exhibits](#) section of this report for a summary of actuarial liabilities by system and plan. For projected benefit payments by year for each system and plan, please visit the [Interactive Reports](#) page on our website. Also, see the [Glossary](#) on our website for brief explanations of the actuarial terms.

## I. SUMMARY OF KEY RESULTS

Assets		
(Dollars in Millions)	2017	2016
<b>All Systems</b>		
Market Value of Assets (MVA)	\$84,853	\$75,273
Actuarial Value of Assets (AVA)	80,168	74,345
Contributions <sup>1</sup>	3,084	2,866
Disbursements	4,093	3,910
Investment Return	10,505	1,760
Other <sup>2</sup>	\$83	\$66
MVA Return <sup>3</sup>	13.44%	2.65%
AVA Return <sup>4</sup>	9.17%	5.41%

<sup>1</sup> Employee and Employer.

<sup>2</sup> Includes transfers, restorations, payables, etc.

<sup>3</sup> Time-weighted rate of return on the Market Value of Assets, net of expenses.

<sup>4</sup> The Actuarial Value of Assets is used in determining contribution rates.

## Assets

The table to the left shows the combined MVA and AVA along with approximate rates of investment return for all the systems combined.

To limit the volatility in contribution rates and funded status due to short-term market fluctuations, we smooth (or defer recognition of) the difference between actual and expected annual investment returns over a period not to exceed eight years. The AVA equals the MVA less the Total Deferred Investment Gains and (Losses) at the valuation date. The AVA can never be less than 70 percent or greater than 130 percent of the MVA.

See the [Actuarial Exhibits](#) section of this report for a summary of assets by system and plan, and for the development of the AVA.

## Funded Status

The funded status helps readers evaluate the health of a pension plan. A history of funded status measured consistently over a defined period helps readers evaluate a plan's funding progress over time. The funded status represents the portion of the actuarial accrued liability covered by today's actuarial assets. A plan with a 100 percent funded status has one dollar in actuarial assets for each dollar of accrued liability at the valuation date. A plan with a funded status of at least 100 percent is generally considered to be on target with its financing plan. However, a plan more/less than 100 percent funded is not automatically considered over-funded/at-risk.

The table to the right displays the funded status for all the systems combined. We provide this table for summarization purposes only. Absent a qualified merger or plan termination, assets from an individual qualified retirement plan may not be used to fund benefits from another plan. See the [Actuarial Exhibits](#) section of this report for the funded status by system and plan.

Funded Status		
(Dollars in Millions)	2017	2016
<b>All Systems</b>		
a. Accrued Liability*	\$92,791	\$88,170
b. Market Value of Assets	84,853	75,273
c. Deferred Gains/(Losses)	4,685	928
d. Actuarial Value of Assets (b - c)	80,168	74,345
Unfunded Liability (a - d)	\$12,623	\$13,825
Funded Ratio (d / a)	86%	84%

Note: Totals may not agree due to rounding.

\*Liabilities valued using Entry Age Normal cost method.

Participant Data		
All Systems	2017	2016
<b>Active Members</b>		
Number	317,677	309,022
Total Salaries (in Millions)	\$20,031	\$18,894
Average Annual Salary	\$63,054	\$61,141
Average Attained Age	46.8	47.1
Average Service	11.5	11.7
<b>Retirees and Beneficiaries</b>		
Number	177,685	170,771
Average Annual Benefit	\$22,768	\$22,474
<b>Terminated Members</b>		
Number Vested	61,519	60,092
Number Non-Vested	135,108	130,036

## Participant Data

The table to the left summarizes participant data used in the actuarial valuation for the plan year ending June 30, 2017, along with information from last year's valuation. See the [Participant Data](#) section of this report for participant data summarized by system and plan.

## Key Assumptions

This table displays key economic assumptions used in the actuarial valuation. With this valuation, we lowered the assumed valuation interest rate from 7.70 to 7.50 percent for all plans except LEOFF 2. LEOFF 2's assumed valuation interest rate decreased from 7.50 to 7.40 percent. For all systems, we also lowered the assumed general salary growth from 3.75 to 3.50 percent and lowered assumed inflation from 3.00 to 2.75 percent.


Key Assumptions	
All Systems	
Valuation Interest Rate*	7.50%
General Salary Increase	3.50%
Inflation	2.75%
Growth in Membership**	0.95%

\*7.40% in LEOFF 2.

\*\*1.25% in TRS. Used for the amortization of PERS 1 and TRS 1 UAAL only.







2017  
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Valuation  
Report



## II. ACTUARIAL EXHIBITS





# Office of the State Actuary

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## **Actuarial Certification Letter Actuarial Valuation Report As of June 30, 2017**

August 2018

This report documents the results of an actuarial valuation of the retirement plans defined under Chapters 41.26, 41.32, 41.35, 41.37, 41.40, and 43.43 of the Revised Code of Washington. The primary purpose of this valuation is to determine contribution requirements for the retirement plans for the 2019-21 Biennium based on a June 30, 2017, measurement date, consistent with the prescribed funding policies. This valuation also provides information on the funding progress and developments in the plans over the past year. This valuation report should not be used for other purposes. Please replace this report with a more recent report when available.

Future actuarial measurements may differ significantly from the current measurements presented in this report if plan experience differs from that anticipated by the assumptions or changes occur in the methods, assumptions, plan provisions or applicable law. We have not performed analysis of the potential range of such future measurements for the purposes of this valuation. Please see the [Risk Assessment](#) page of our website for stochastic analysis of possible future outcomes.

The valuation results summarized in this report involve calculations that require assumptions about future economic and demographic events. We believe that the assumptions and methods used in the underlying valuation are reasonable and appropriate for the primary purpose stated above. The use of another set of assumptions and methods, however, could also be reasonable and could produce materially different results. Actual results may vary from our expectations.

Recent increases in state funding for basic education may lead to higher than expected short-term salary increases for members of TRS and SERS. This experience, by itself, could materially change the current measurements in this report for TRS and SERS. We are currently monitoring this experience and plan to consult with the Legislature if this experience materializes prior to our next actuarial valuation report.

For all plans with the exception of the Law Enforcement Officers' and Fire Fighters' Retirement System (LEOFF) Plan 2, the assumptions used in this valuation for investment return, inflation, salary growth, and membership growth were prescribed by the Pension Funding Council (PFC) and are subject to revision by the Legislature. For LEOFF Plan 2, these assumptions are prescribed by the LEOFF Plan 2 Retirement Board. Please see our latest [Economic Experience Study](#) report for further information on the economic assumptions. We developed the demographic assumptions used in this valuation during the [2007-2012 Demographic Experience Study](#). The Legislature prescribed the actuarial cost and asset valuation methods. In our opinion, all methods, assumptions, and calculations are reasonable and are in conformity with generally accepted actuarial principles and standards of practice as of the date of this publication.



The Department of Retirement Systems (DRS) provided us with audited member and beneficiary data. We checked the data for reasonableness as appropriate based on the purpose of the valuation. The Washington State Investment Board (WSIB) and DRS provided audited financial and asset information. We relied on all the information provided as complete and accurate. In our opinion, this information is adequate and substantially complete for purposes of this valuation.

The asset smoothing method adopted during the 2003 Legislative Session (Chapter 11, Laws of 2003, E1) was intended to address the volatility of contribution rates under the aggregate funding method when used in combination with the existing asset allocation policy of WSIB. The combination of the current asset smoothing method with any other funding method or asset allocation policy may not be appropriate. The Legislature may need to revisit the application of the current asset smoothing method with the Plan 1 funding method as the duration of liabilities in those plans becomes shorter.

Under legislation enacted in 2009 (Chapter 561, Laws of 2009), the Unfunded Actuarial Accrued Liability (UAAL) in the Public Employees' Retirement System (PERS) and the Teachers' Retirement System (TRS) Plans 1 must be amortized over a rolling ten-year period, as a level percentage of projected system payroll. The projected payroll includes pay from current members of PERS and TRS Plans 2/3, as well as projected payroll from future new members. For PERS, the projected payroll also includes current and projected payroll from retirement systems previously covered under PERS. As a result of this method, all employers of PERS, School Employees' Retirement System (SERS), and Public Safety Employees' Retirement System (PSERS) contribute to the PERS 1 UAAL. All employers of TRS contribute to the TRS 1 UAAL. This is a non-standard amortization method since it includes payroll outside the plan. Additionally, the funding method includes minimum contribution rates effective at the beginning of the 2015-17 Biennium. All contributions required under this method are necessary to fully amortize the UAAL in these plans. Failure to make all future required contributions may result in premature plan insolvency.

The Plan 1 funding method for PERS 1 and TRS 1 is also non-standard in its use of the employer normal cost rate from the Plans 2/3 instead of the underlying Plan 1 employer normal cost rate. However, we find this method reasonable and appropriate given the limited remaining future salary in Plan 1 and the relatively short period for amortizing the UAAL. Furthermore, Plan 1 member normal cost rates are fixed in statute at 6 percent and the use of the Plan 2/3 employer normal cost for Plan 1 allows the Legislature to charge all employers the same contribution rate regardless of the plan in which employees hold membership (except for LEOFF).

The undersigned, with actuarial credentials, meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. While this report is intended to be complete, we are available to offer extra advice and explanations as needed.

Sincerely,

Matthew M. Smith, FCA, EA, MAAA  
State Actuary

Luke Masselink, ASA, EA, MAAA  
Senior Actuary

## Contribution Rates

Member and Employer Rate Summary				
	Plan 1		Plans 2/3	
	2017	2016	2017	2016
<b>PERS</b>				
Member*	6.00%	6.00%	7.90%	8.34%
Employer (Normal Cost)	7.92%	8.45%	7.92%	8.45%
Employer (Plan 1 UAAL)	4.76%	5.05%	4.76%	5.05%
Total Employer	12.68%	13.50%	12.68%	13.50%
<b>TRS</b>				
Member*	6.00%	6.00%	7.77%	7.98%
Employer (Normal Cost)	8.15%	8.75%	8.15%	8.75%
Employer (Plan 1 UAAL)	7.18%	7.43%	7.18%	7.43%
Total Employer	15.33%	16.18%	15.33%	16.18%
<b>SERS</b>				
Member*	N/A	N/A	8.25%	8.46%
Employer (Normal Cost)	N/A	N/A	8.25%	9.46%
Employer (PERS Plan 1 UAAL)	N/A	N/A	4.76%	5.05%
Total Employer	N/A	N/A	13.01%	14.51%
<b>PSERS</b>				
Member	N/A	N/A	7.20%	6.98%
Employer (Normal Cost)	N/A	N/A	7.20%	6.98%
Employer (PERS Plan 1 UAAL)	N/A	N/A	4.76%	5.05%
Total Employer	N/A	N/A	11.96%	12.03%
<b>LEOFF</b>				
Member	0.00%	0.00%	8.59%	7.91%
Employer	0.00%	0.00%	5.15%	4.75%
State (Normal Cost)	0.00%	0.00%	3.44%	3.16%
State (Plan 1 UAAL)	0.00%	0.00%	0.00%	0.00%
Total State	0.00%	0.00%	3.44%	3.16%
<b>WSPRS</b>				
Member	8.45%	7.68%	8.45%	7.68%
Employer (State)	22.13%	24.86%	22.13%	24.86%

Note: Employer rates exclude administrative expense rate.

\*Plan 3 members do not contribute to the defined benefit plan.

Development of 2017 Employer/State Rates					
	PERS		TRS		SERS
	Plan 1	Plans 2/3	Plan 1	Plans 2/3	Plans 2/3
a. Total Normal Cost	13.92%	15.82%	14.15%	15.92%	16.50%
b. Member Normal Cost*	6.00%	7.90%	6.00%	7.77%	8.25%
c. Employer Contribution (a - b)	7.92%	7.92%	8.15%	8.15%	8.25%
d. Cost to Amortize UAAL	4.76%	4.76%	7.18%	7.18%	4.76%
e. Total Employer Rate (c + d)	<b>12.68%</b>	<b>12.68%</b>	<b>15.33%</b>	<b>15.33%</b>	<b>13.01%</b>

Note: Employer rates exclude administrative expense rate.

\*Plan 3 members do not contribute to the defined benefit plan. TRS 2 member rate may be subject to a member maximum rate.

## II. ACTUARIAL EXHIBITS

Development of 2017 Employer/State Rates (Continued)					
	PSERS		LEOFF		WSPRS
	Plan 2	Plan 1	Plan 2	Plans 1/2	
a. Total Normal Cost	14.40%	0.00%	17.18%	30.58%	
b. Member Normal Cost*	7.20%	0.00%	8.59%	8.45%	
c. Employer Contribution (a - b)	7.20%	0.00%	8.59%	22.13%	
d. Cost to Amortize UAAL	4.76%	0.00%	0.00%	N/A	
e. Total Employer Rate (c + d)**	<b>11.96%</b>	<b>0.00%</b>	<b>5.15%</b>	<b>22.13%</b>	

Note: Employer rates exclude administrative expense rate.

\*Plan 3 members do not contribute to the defined benefit plan. WSPRS member rate may be subject to a member maximum rate.

\*\*The state pays 20% of the total normal cost for LEOFF 2. This reduces the total employer contribution rate from 8.59% to 5.15%.

TRS Plan 2 Maximum Member Contribution Rates					
Valuation Year	Prior Max	Supplemental	Source	Description	New Max
2010 - 2017	8.63%	0.01%	C 5 L 11	AFC protection against reduced salaries	8.64%
2007 - 2009	8.55%	0.08%	C 101 L 08	Out-of-state service credit purchases	8.63%
2006	7.76%	0.79%	C 491 L 07	Improved Subsidized ERFs for certain Plan 2/3 members	8.55%
2005	7.75%	0.01%	C 33 L 06	Lowered vesting requirements for certain Plan 3 members	7.76%
1999 - 2004	6.59%	1.16%	C 247 L 00	Subsidized ERFs for Plan 2/3 members	7.75%
1997 - 1998	N/A	N/A	N/A		6.59%

Note: Maximum member contribution rates change each year by 50% of benefit improvements, except as stated in RCW 41.45.070.

WSPRS Plan 1/2 Maximum Member Contribution Rates					
Valuation Year	Prior Max	Supplemental	Source	Description	New Max
2017	8.44%	0.01%	C 61 L 18	Modified the definition of "Veteran"	8.45%
2016*	7.68%	0.76%	C 181 L 17	Expanded the definition of pensionable overtime	8.44%
	7.34%	0.34%			7.68%
2014 - 2015	7.19%	0.15%	C 78 L 15	L&I duty-related death benefits paid from pension trust fund on remarriage	7.34%
2009 - 2013	7.18%	0.01%	C 261 L 10	Increased duty-related death benefits	7.19%
2008	6.95%	0.23%	C 522 L 09	Survivor benefits for registered domestic partners	7.18%
2006** - 2007	N/A	N/A	N/A		6.95%

Note: Maximum member contribution rates change each year by 50% of benefit improvements, except as stated in RCW 41.45.070.

\*This law stipulated a phased increase to the member maximum rate by applying 0.34% in fiscal year 2018 and 0.76% in Fiscal Year 2019.

\*\*The original maximum contribution rate of 7% was decreased by 0.05% for C 87 L 07 (Raised maximum retirement age, 0.14% decrease) and C 488 L 07 (Provided medical premium reimbursements for certain survivors, 0.09% increase).

The following table compares the member and total employer contribution rates that were adopted by the PFC against the rates that were calculated by OSA. Note that the 2017-19 Adopted rates we display below include the supplemental rate that was charged following the 2017 Legislative Session.

Contribution Rates			
	2017-19 Adopted*	2019-21 Calculated	2019-21 Adopted
<b>PERS 1</b>			
Member	6.00%	6.00%	6.00%
Total Employer	12.52%	12.68%	12.68%
<b>PERS 2/3</b>			
Member**	7.38%	7.90%	7.90%
Total Employer	12.52%	12.68%	12.68%
<b>TRS 1</b>			
Member	6.00%	6.00%	6.00%
Total Employer	15.02%	15.33%	15.33%
<b>TRS 2/3</b>			
Member**	7.06%	7.77%	7.77%
Total Employer	15.02%	15.33%	15.33%
<b>SERS 2/3</b>			
Member**	7.27%	8.25%	8.25%
Total Employer	13.30%	13.01%	13.01%
<b>PSERS 2</b>			
Member	6.74%	7.20%	7.20%
Total Employer	11.77%	11.96%	11.96%
<b>LEOFF 1</b>			
Member	0.00%	0.00%	0.00%
Employer	0.00%	0.00%	0.00%
State	0.00%	0.00%	0.00%
<b>LEOFF 2***</b>			
Member	8.75%	8.59%	8.59%
Employer	5.25%	5.15%	5.15%
State	3.50%	3.44%	3.44%
<b>WSPRS 1/2</b>			
Member	7.68%	8.45%	8.45%
Employer (State)	20.15%	22.13%	22.13%

Employer rates exclude administrative expense rate.

\*2017-19 adopted rates include 2017 Session supplemental rate.

\*\*Plan 3 members do not contribute to the defined benefit plan.

\*\*\*The LEOFF 2 Board adopts contribution rates for LEOFF 2.

The tables on the following pages show the development of the normal cost rates and the Plan 1 UAAL rates. Consistent with current funding policy, the normal cost rates include minimum contribution rates to provide stable and adequate contribution rates over time. The minimum normal cost rates are a percent of the normal cost calculated under the Entry Age Normal (EAN) funding method. The percent is 70 percent for Washington State Patrol Retirement System (WSPRS) Plans 1 and 2, 100 percent for LEOFF Plan 2, and 80 percent for all other plans.

The PERS 1 and TRS 1 UAAL, under current funding policy, must be amortized over a rolling ten-year period, as a level percentage of projected system payroll. All employers of PERS, SERS, and PSERS members contribute toward the PERS 1 UAAL, while all employers of TRS members contribute toward the TRS 1 UAAL. UAAL rates also include minimum contribution rates to ensure complete amortization of the UAAL. The minimum UAAL rate is 3.50 percent in PERS 1 and 5.75 percent in TRS 1. Please see the [Glossary](#) for a more detailed explanation of EAN and UAAL.

We provide additional contribution rate calculations on the [Interactive Reports](#) page of our website. This interactive report calculates member and employer contribution rates that vary based on the asset valuation method and discount rate that the user selects. The state's funding policy, defined under [Chapter 41.45 RCW](#), does not vary based on these selections.

## II. ACTUARIAL EXHIBITS

<b>Development of Normal Cost Rates</b>			
<i>(Dollars in Millions)</i>	PERS 2/3	TRS 2/3	SERS 2/3
<b>1. Calculated Member Normal Cost Rate</b>			
a. Future Value of Fully Projected Benefits	\$285,096	\$150,671	\$38,460
b. Present Value of Fully Projected Benefits	45,200	17,514	6,486
c. Valuation Assets	33,191	11,885	4,613
d. Unfunded Fully Projected Benefits (b - c)	12,009	5,628	1,873
e. Past Liability Balance	24	107	6
f. Adjusted Unfunded (d - e)	\$11,984	\$5,522	\$1,867
<b>Present Value of Projected Salaries to Current Members (PVS)</b>			
g. Plan 1 PVS	N/A	N/A	N/A
h. Plan 2 PVS	66,344	14,832	6,952
i. Plan 3 PVS	19,582	41,376	8,716
j. Weighted PVS (2g + 2h + i)	\$152,270	\$71,040	\$22,620
k. Member Normal Cost (f / j)	7.87%	7.77%	8.25%
l. Member Minimum Contribution Rate	4.35%	5.11%	4.57%
m. Prior Year Member Maximum Contribution Rate <sup>1</sup>	N/A	8.64%	N/A
n. Member Contribution Rate with Max/Min	7.87%	7.77%	8.25%
o. Change In Plan Provisions (Laws of 2018)	0.03%	0.00%	0.00%
p. Calculated Member Contribution Rate (n + o) <sup>2</sup>	7.90%	7.77%	8.25%
<b>2. Calculated Employer Normal Cost Rate</b>			
a. Present Value of Fully Projected Benefits	\$45,200	\$17,514	\$6,486
b. Valuation Assets	33,191	11,885	4,613
c. Unfunded Benefits (a - b)	12,009	5,628	1,873
d. Present Value of Member Contributions	5,221	1,153	574
e. Past Liability Balance	24	107	6
f. Employer Responsibility (c - d - e)	\$6,763	\$4,369	\$1,293
<b>Present Value of Projected Salaries to Current Members (PVS)</b>			
g. Plan 1 PVS	N/A	N/A	N/A
h. Plan 2 PVS	66,344	14,832	6,952
i. Plan 3 PVS	19,582	41,376	8,716
j. Total PVS (g + h + i)	\$85,926	\$56,208	\$15,668
k. Employer Normal Cost (f / j)	7.87%	7.77%	8.25%
l. Employer Minimum Contribution Rate	4.35%	5.11%	4.57%
m. Employer Contribution Rate with Minimum	7.87%	7.77%	8.25%
n. Excess Employer Rate <sup>1</sup>	N/A	0.00%	N/A
o. Rate to Amortize Past Liability Balance <sup>3</sup>	0.02%	0.38%	0.00%
p. Change In Plan Provisions (Laws of 2018)	0.03%	0.00%	0.00%
q. Calculated Employer Contribution Rate (m + n + o + p) <sup>4</sup>	7.92%	8.15%	8.25%
<b>3. Adopted Normal Cost Rates for 2019-21<sup>5</sup></b>			
a. Member Contribution Rate	7.90%	7.77%	8.25%
b. Employer Contribution Rate	7.92%	8.15%	8.25%
c. State Contribution Rate	N/A	N/A	N/A
d. <b>Total Contribution Rate (a + b + c)</b>	<b>15.82%</b>	<b>15.92%</b>	<b>16.50%</b>

Note: Totals may not agree due to rounding.

<sup>1</sup> TRS 2 members pay 50% of the total normal cost, not to exceed an adjusted cap. The employer pays the excess.

<sup>2</sup> Plan 3 members do not contribute to the defined benefit plan.

<sup>3</sup> PERS, TRS, and SERS liability is attributable to past Plan 3 gain-sharing. For PERS and TRS, this rate has been reduced since the gain-sharing liability is expected to be paid off in the 2019-21 Biennium. For SERS, no rate is expected to be needed in the 2019-21 Biennium.

<sup>4</sup> For all plans except LEOFF Plan 2, the calculated rates include the final step of a three-biennial phase-in of the cost associated with the mortality improvement assumption change from the 2013 AVR.

<sup>5</sup> LEOFF 2 rates adopted by LEOFF 2 Board; all others adopted by the PFC.



Development of Normal Cost Rates (Continued)				
<i>(Dollars in Millions)</i>				
	PSERS 2	LEOFF 2	WSPRS 1/2	
<b>1. Calculated Member Normal Cost Rate</b>				
a.	Future Value of Fully Projected Benefits	\$15,644	\$100,995	\$8,518
b.	Present Value of Fully Projected Benefits	996	13,672	1,448
c.	Valuation Assets	480	11,037	1,144
d.	Unfunded Fully Projected Benefits (b - c)	515	2,635	304
e.	Past Liability Balance	0	0	8
f.	Adjusted Unfunded (d - e)	\$515	\$2,635	\$296
<b>Present Value of Projected Salaries to Current Members (PVS)</b>				
g.	Plan 1 PVS	N/A	N/A	\$ 301.00
h.	Plan 2 PVS	3,750	20,614	711
i.	Plan 3 PVS	N/A	N/A	N/A
j.	Weighted PVS (2g + 2h + i)	\$7,501	\$41,227	\$2,023
k.	Member Normal Cost (f / j)	6.87%	6.39%	14.62%
l.	Member Minimum Contribution Rate	5.53%	8.54%	7.35%
m.	Prior Year Member Maximum Contribution Rate <sup>1</sup>	N/A	N/A	8.44%
n.	Member Contribution Rate with Max/Min	6.87%	8.54%	8.44%
o.	Change In Plan Provisions (Laws of 2018)	0.33%	0.05%	0.01%
p.	Calculated Member Contribution Rate (n + o)	7.20%	8.59%	8.45%
<b>2. Calculated Employer Normal Cost Rate</b>				
a.	Present Value of Fully Projected Benefits	\$996	\$13,672	\$1,448
b.	Valuation Assets	480	11,037	1,144
c.	Unfunded Benefits (a - b)	515	2,635	304
d.	Present Value of Member Contributions	258	1,317	148
e.	Past Liability Balance	0	0	8
f.	Employer Responsibility (c - d - e)	\$258	\$1,317	\$148
<b>Present Value of Projected Salaries to Current Members (PVS)</b>				
g.	Plan 1 PVS	N/A	N/A	\$301
h.	Plan 2 PVS	3,750	20,614	711
i.	Plan 3 PVS	N/A	N/A	N/A
j.	Total PVS (g + h + i)	\$3,750	\$20,614	\$1,012
k.	Employer Normal Cost (f / j)	6.87%	6.39%	14.62%
l.	Employer Minimum Contribution Rate	5.53%	8.54%	7.35%
m.	Employer Contribution Rate with Minimum	6.87%	8.54%	14.62%
n.	Excess Employer Rate <sup>1</sup>	N/A	N/A	6.18%
o.	Rate to Amortize Past Liability Balance <sup>2</sup>	N/A	N/A	1.32%
p.	Change In Plan Provisions (Laws of 2018)	0.33%	0.05%	0.01%
q.	Calculated Employer Contribution Rate (m + n + o + p) <sup>3</sup>	7.20%	8.59%	22.13%
<b>3. Adopted Normal Cost Rates for 2019-21<sup>4</sup></b>				
a.	Member Contribution Rate <sup>5</sup>	7.20%	8.59%	8.45%
b.	Employer Contribution Rate <sup>5</sup>	7.20%	5.15%	22.13%
c.	State Contribution Rate <sup>5</sup>	N/A	3.44%	N/A
d.	<b>Total Contribution Rate (a + b + c)</b>	<b>14.40%</b>	<b>17.18%</b>	<b>30.58%</b>

Note: Totals may not agree due to rounding.

<sup>1</sup> WSPRS members pay 50% of the total normal cost, not to exceed an adjusted cap. The employer pays the excess.

<sup>2</sup> WSPRS liability is attributable to past costs for improved survivor benefits.

<sup>3</sup> For all plans except LEOFF Plan 2, the calculated rates include the final step of a three-biennial phase-in of the cost associated with the mortality improvement assumption change from the 2013 AVR.

<sup>4</sup> LEOFF 2 rates adopted by LEOFF 2 Board; all others adopted by the PFC.

<sup>5</sup> LEOFF 2 rate: 50% Member, 30% Employer, 20% State.

Actuarial Liabilities

Amortization of the Plan 1 Unfunded Actuarial Accrued Liability (UAAL)			
<i>(Dollars in Millions)</i>			
	PERS 1	TRS 1	LEOFF 1
a. Future Value of Fully Projected Benefits	\$27,334	\$19,481	\$9,449
b. Present Value of Fully Projected Benefits (PVFB)	12,307	8,842	4,124
c. Valuation Assets	7,042	5,371	5,403
d. Actuarial Present Value of Future Normal Costs	70	22	0
e. Balance of Plan 1 Benefit Improvements <sup>1</sup>	96	42	N/A
<b>f. UAAL (b - c - d - e)</b>	<b>\$5,099</b>	<b>\$3,407</b>	<b>(\$1,280)</b>
g. Amortization Date	N/A	N/A	6/30/2024
h. Present Value of Projected Salaries <sup>2</sup>	\$112,690	\$49,998	\$8,673
i. Contribution Rate Before Adjustments (f / h)	4.52%	6.82%	(14.76%)
j. Minimum Contribution Rate	3.50%	5.75%	N/A
k. Preliminary Contribution Rate	4.52%	6.82%	(14.76%)
l. Plan 1 Benefit Improvements	0.14%	0.15%	N/A
m. Change In Plan Provisions (Laws of 2018)	0.10%	0.21%	0.00%
<b>n. Calculated Plan 1 UAAL Contribution Rates (k + l + m)<sup>3</sup></b>	<b>4.76%</b>	<b>7.18%</b>	<b>(14.76%)<sup>4</sup></b>
<b>Adopted Plan 1 UAAL Contribution Rates for 2019-21</b>	<b>4.76%</b>	<b>7.18%</b>	<b>0.00%</b>

Note: Totals may not agree due to rounding.

<sup>1</sup> As stated in RCW 41.45.060, the cost of funding Plan 1 benefit improvements shall be amortized over a fixed 10-year period.

<sup>2</sup> Measured under the plan's amortization method.

<sup>3</sup> Calculated rates include the final step of a three-biennial phase-in of the cost associated with the mortality improvement assumption change from the 2013 AVR.

<sup>4</sup> No LEOFF 1 UAAL contributions are required when the plan is fully funded under current methods and assumptions.

Present Value of Fully Projected Benefits						
<i>(Dollars in Millions)</i>						
	PERS			TRS		
	Plan 1	Plans 2/3	Total	Plan 1	Plans 2/3	Total
<b>Active Members</b>						
Retirement	\$833	\$28,309	\$29,142	\$320	\$12,317	\$12,637
Termination	0	979	979	0	458	458
Death	11	275	286	2	101	103
Disability	0	159	159	0	15	15
ROC* on Termination	0	358	358	0	45	45
ROC* on Death	17	262	279	5	32	38
<b>Total Active</b>	<b>\$861</b>	<b>\$30,343</b>	<b>\$31,203</b>	<b>\$328</b>	<b>\$12,968</b>	<b>\$13,296</b>
<b>Inactive Members</b>						
Terminated	\$101	\$3,122	\$3,223	\$28	\$1,148	\$1,175
Service Retired	10,530	11,203	21,732	8,011	3,313	11,324
Disability Retired	107	144	251	78	12	90
Survivors	709	389	1,097	397	73	470
<b>Total Inactive</b>	<b>\$11,446</b>	<b>\$14,857</b>	<b>\$26,304</b>	<b>\$8,514</b>	<b>\$4,546</b>	<b>\$13,059</b>
Laws of 2018	105	(152)	(48)	97	0	97
<b>2017 Total</b>	<b>\$12,412</b>	<b>\$45,048</b>	<b>\$57,459</b>	<b>\$8,938</b>	<b>\$17,514</b>	<b>\$26,452</b>
<b>2016 Total</b>	<b>\$12,409</b>	<b>\$42,403</b>	<b>\$54,812</b>	<b>\$8,927</b>	<b>\$16,076</b>	<b>\$25,003</b>

Note: Totals may not agree due to rounding.

\*Return of Contributions.

Present Value of Fully Projected Benefits (Continued)						
(Dollars in Millions)	SERS	PSERS	LEOFF		WSPRS	
	Plans 2/3	Plan 2	Plan 1	Plan 2	Total	Plans 1/2
<b>Active Members</b>						
Retirement	\$3,853	\$828	\$52	\$8,911	\$8,963	\$594
Termination	236	55	0	160	160	4
Death	40	6	0	126	127	6
Disability	17	5	0	413	413	2
ROC* on Termination	43	27	0	108	108	2
ROC* on Death	24	11	0	156	156	3
<b>Total Active</b>	<b>\$4,214</b>	<b>\$932</b>	<b>\$53</b>	<b>\$9,873</b>	<b>\$9,926</b>	<b>\$611</b>
<b>Inactive Members</b>						
Terminated	\$654	\$42	\$0	\$221	\$221	\$18
Service Retired	1,558	21	1,854	3,241	5,094	746
Disability Retired	16	1	1,592	203	1,795	6
Survivors	44	0	624	135	760	67
<b>Total Inactive</b>	<b>\$2,272</b>	<b>\$63</b>	<b>\$4,071</b>	<b>\$3,799</b>	<b>\$7,869</b>	<b>\$837</b>
Laws of 2018	0	218	0	17	17	0
<b>2017 Total</b>	<b>\$6,486</b>	<b>\$1,213</b>	<b>\$4,124</b>	<b>\$13,689</b>	<b>\$17,813</b>	<b>\$1,448</b>
<b>2016 Total</b>	<b>\$5,974</b>	<b>\$879</b>	<b>\$4,202</b>	<b>\$13,013</b>	<b>\$17,215</b>	<b>\$1,368</b>

Note: Totals may not agree due to rounding.

\*Return of Contributions.

Entry Age Normal Accrued Liability*						
(Dollars in Millions)	PERS			TRS		
	Plan 1	Plans 2/3	Total	Plan 1	Plans 2/3	Total
<b>Active Members</b>						
Retirement	\$779	\$21,763	\$22,542	\$304	\$8,350	\$8,653
Termination	(8)	304	296	(2)	129	127
Death	10	208	218	2	67	69
Disability	(2)	79	77	(0)	6	5
ROC** on Termination	(5)	(195)	(200)	(1)	(16)	(16)
ROC** on Death	16	176	192	5	14	19
<b>Total Active</b>	<b>\$790</b>	<b>\$22,335</b>	<b>\$23,125</b>	<b>\$307</b>	<b>\$8,549</b>	<b>\$8,857</b>
<b>Inactive Members</b>						
Terminated	\$101	\$3,122	\$3,223	\$28	\$1,148	\$1,175
Service Retired	10,530	11,203	21,732	8,011	3,313	11,324
Disability Retired	107	144	251	78	12	90
Survivors	709	389	1,097	397	73	470
<b>Total Inactive</b>	<b>\$11,446</b>	<b>\$14,857</b>	<b>\$26,304</b>	<b>\$8,514</b>	<b>\$4,546</b>	<b>\$13,059</b>
Laws of 2018	105	(27)	78	97	0	97
<b>2017 Total</b>	<b>\$12,341</b>	<b>\$37,166</b>	<b>\$49,507</b>	<b>\$8,918</b>	<b>\$13,095</b>	<b>\$22,013</b>
<b>2016 Total</b>	<b>\$12,323</b>	<b>\$34,759</b>	<b>\$47,082</b>	<b>\$8,900</b>	<b>\$11,983</b>	<b>\$20,883</b>

Note: Totals may not agree due to rounding.

\*Calculated using the Entry Age Normal (EAN) cost method. This method was not used to determine contribution requirements.

\*\*Return of Contributions.

## II. ACTUARIAL EXHIBITS

Entry Age Normal Accrued Liability*						
(Continued)						
(Dollars in Millions)	SERS	PSERS	LEOFF		WSPRS	
	Plans 2/3	Plan 2	Plan 1	Plan 2	Total	Plans 1/2
<b>Active Members</b>						
Retirement	\$2,868	\$419	\$52	\$5,994	\$6,045	\$402
Termination	64	19	(0)	31	31	1
Death	28	3	0	44	44	2
Disability	7	2	(1)	226	225	1
ROC** on Termination	(12)	(6)	0	(30)	(30)	(1)
ROC** on Death	15	5	0	95	95	1
<b>Total Active</b>	<b>\$2,969</b>	<b>\$442</b>	<b>\$50</b>	<b>\$6,360</b>	<b>\$6,410</b>	<b>\$407</b>
<b>Inactive Members</b>						
Terminated	\$654	\$42	\$0	\$221	\$221	\$18
Service Retired	1,558	21	1,854	3,241	5,094	746
Disability Retired	16	1	1,592	203	1,795	6
Survivors	44	0	624	135	760	67
<b>Total Inactive</b>	<b>\$2,272</b>	<b>\$63</b>	<b>\$4,071</b>	<b>\$3,799</b>	<b>\$7,869</b>	<b>\$837</b>
Laws of 2018	0	0	0	1	1	0
<b>2017 Total</b>	<b>\$5,242</b>	<b>\$506</b>	<b>\$4,121</b>	<b>\$10,160</b>	<b>\$14,281</b>	<b>\$1,244</b>
<b>2016 Total</b>	<b>\$4,826</b>	<b>\$425</b>	<b>\$4,197</b>	<b>\$9,571</b>	<b>\$13,768</b>	<b>\$1,186</b>

Note: Totals may not agree due to rounding.

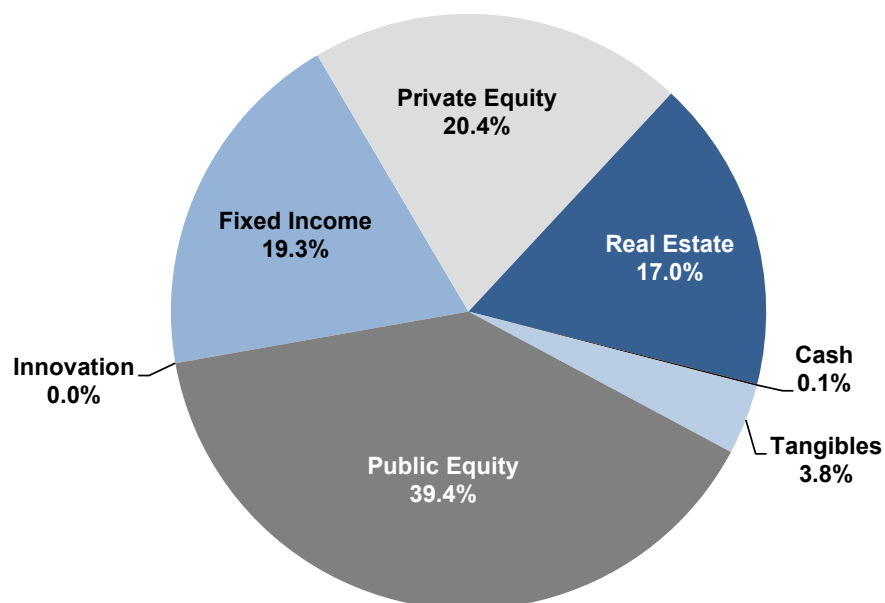
\*Calculated using the Entry Age Normal (EAN) cost method. This method was not used to determine contribution requirements.

\*\*Return of Contributions.

We report expected projected benefit payments, as well as the present value of these payments, on our website by year and by plan under the statutorily assumed interest rate. We also show supplementary benefit payment projections that vary by interest rate assumptions. For more information or to view projected benefit payments, please visit the [Interactive Reports](#) page on our website.

## Plan Assets

### Retirement Commingled Trust Fund (CTF) Asset Allocation



*Note: Innovation allocation was 0.03%.*

*Source: Washington State Investment Board.*

**Cash:** Highly liquid, very safe investments that can be easily converted into cash, such as Treasury Bills and money-market funds.

**Fixed Income:** Securities representing debt obligations and usually having fixed payments and maturities. Different types of fixed income securities include government and corporate bonds, mortgage-backed securities, asset-backed securities, convertible issues, and may also include money-market instruments.

**Innovation:** Fund that provides the ability to invest in a broad range of assets that fall outside the traditional asset classes or management style of existing asset classes.

**Public Equity:** Shares of U.S. and non-U.S. corporations that trade on public exchanges or "over-the-counter." The ownership of a corporation is represented by shares that are claimed on the corporation's earnings and assets.

**Private Equity:** The infusion of equity capital into a private company (one that is not available on the public markets). Private equity investments include securities that are not listed on a public exchange and are not easily accessible to most individuals. These investments range from initial capital in start-up enterprises to leveraged buyouts of mature corporations.

**Real Estate:** An externally-managed selection of partnership investments with the majority of the partnerships invested in high-quality real estate leased to third parties.

**Tangibles:** The tangible asset portfolio invests in sectors such as infrastructure, timber, agriculture, natural resources, commodities, or other sectors consistent with the goals of the asset class.

## II. ACTUARIAL EXHIBITS

Change in Market Value of Assets						
(Dollars in Millions)	PERS			TRS		
	Plan 1 Fund 631	Plans 2/3* Fund 641	Total	Plan 1 Fund 632	Plans 2/3* Fund 642	Total
<b>2016 Market Value</b>	<b>\$7,126</b>	<b>\$30,483</b>	<b>\$37,609</b>	<b>\$5,587</b>	<b>\$10,799</b>	<b>\$16,386</b>
<b>Revenue</b>						
<b>Contributions</b>						
Member	\$11	\$486	\$497	\$4	\$75	\$79
Employer/State	609	622	1,231	349	364	713
<b>Total Contributions</b>	<b>620</b>	<b>1,108</b>	<b>1,729</b>	<b>353</b>	<b>440</b>	<b>792</b>
Investment Return	945	4,313	5,258	729	1,539	2,268
Restorations**	4	32	36	3	6	9
Transfers In	0	0	0	0	0	0
Miscellaneous	0	0	0	0	0	0
<b>Total Revenue</b>	<b>\$1,570</b>	<b>\$5,454</b>	<b>\$7,024</b>	<b>\$1,085</b>	<b>\$1,985</b>	<b>\$3,070</b>
<b>Disbursements</b>						
Monthly Benefits***	\$1,196	\$894	\$2,090	\$911	\$255	\$1,166
Refunds	3	37	41	1	3	4
<b>Total Benefits</b>	<b>1,199</b>	<b>932</b>	<b>2,131</b>	<b>912</b>	<b>258</b>	<b>1,170</b>
Transfers Out	0	4	4	0	3	3
Expenses	0	0	1	0	0	0
<b>Total Disbursements</b>	<b>\$1,200</b>	<b>\$936</b>	<b>\$2,135</b>	<b>\$912</b>	<b>\$260</b>	<b>\$1,173</b>
<b>Payables</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>2017 Market Value</b>	<b>\$7,497</b>	<b>\$35,001</b>	<b>\$42,498</b>	<b>\$5,759</b>	<b>\$12,524</b>	<b>\$18,283</b>
<b>2017 Actuarial Value</b>	<b>\$7,042</b>	<b>\$33,191</b>	<b>\$40,234</b>	<b>\$5,371</b>	<b>\$11,885</b>	<b>\$17,256</b>
<b>Ratio (AV / MV)</b>	<b>94%</b>	<b>95%</b>	<b>95%</b>	<b>93%</b>	<b>95%</b>	<b>94%</b>

Note: Totals may not agree due to rounding.

\*Defined Benefit portion only.

\*\*Includes additional annuity purchases and service credit purchases.

\*\*\*TRS Plan 1 value includes annuity cashouts.

Change in Market Value of Assets (Continued)							
(Dollars in Millions)	SERS	PSERS	LEOFF		WSPRS	Total	
	Plans 2/3*	Plan 2	Plan 1	Plan 2		Plans 1/2	
	Fund 633	Fund 635	Fund 819	Fund 829	Total	Fund 615	
<b>2016 Market Value</b>	<b>\$4,214</b>	<b>\$401</b>	<b>\$5,371</b>	<b>\$10,194</b>	<b>\$15,565</b>	<b>\$1,098</b>	<b>\$75,273</b>
<b>Revenue</b>							
<b>Contributions</b>							
Member	52	23	0	158	158	6	\$817
Employer/State	135	23	0	158	158	8	2,268
<b>Total Contributions</b>	<b>186</b>	<b>47</b>	<b>0</b>	<b>316</b>	<b>316</b>	<b>14</b>	<b>3,084</b>
Investment Return	598	60	724	1,446	2,170	151	10,505
Restorations**	1	0	2	30	32	4	82
Transfers In	0	0	0	0	0	1	1
Miscellaneous	0	0	0	0	0	0	0
<b>Total Revenue</b>	<b>\$785</b>	<b>\$107</b>	<b>\$726</b>	<b>\$1,792</b>	<b>\$2,518</b>	<b>\$170</b>	<b>\$13,673</b>
<b>Disbursements</b>							
Monthly Benefits	\$130	\$1	\$360	\$220	\$580	\$57	\$4,024
Refunds	3	3	0	7	7	0	58
<b>Total Benefits</b>	<b>133</b>	<b>4</b>	<b>360</b>	<b>227</b>	<b>587</b>	<b>57</b>	<b>4,082</b>
Transfers Out	2	0	0	0	0	0	8
Expenses	0	0	0	2	2	0	3
<b>Total Disbursements</b>	<b>\$136</b>	<b>\$4</b>	<b>\$360</b>	<b>\$229</b>	<b>\$589</b>	<b>\$57</b>	<b>\$4,093</b>
<b>Payables</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>2017 Market Value***</b>	<b>\$4,864</b>	<b>\$504</b>	<b>\$5,736</b>	<b>\$11,758</b>	<b>\$17,494</b>	<b>\$1,211</b>	<b>\$84,853</b>
<b>2017 Actuarial Value***</b>	<b>\$4,613</b>	<b>\$480</b>	<b>\$5,403</b>	<b>\$11,037</b>	<b>\$16,441</b>	<b>\$1,144</b>	<b>\$80,168</b>
<b>Ratio (AV / MV)</b>	<b>95%</b>	<b>95%</b>	<b>94%</b>	<b>94%</b>	<b>94%</b>	<b>95%</b>	<b>94%</b>

Note: Totals may not agree due to rounding.

\*Defined Benefit portion only.

\*\*Includes additional annuity purchases and service credit purchases.

\*\*\*LEOFF 2's 2017 MV and AV excludes \$18.4 million held in the LEOFF 2 Benefit Improvement Account.

Calculation of Actuarial Value of Assets							
(Dollars in Millions)		PERS 1	PERS 2/3*	TRS 1	TRS 2/3*	SERS 2/3*	
a.	Market Value at 6/30/2017	\$7,497	\$35,001	\$5,759	\$12,524	\$4,864	
<b>Deferred Gains and (Losses)</b>							
	Plan Year Ending	Smoothing Period	Years Remaining				
	6/30/2017	7	6	\$358	\$1,679	\$304	\$598
	6/30/2016	6	4	(267)	(1,035)	(215)	(363)
	6/30/2015	4	1	(64)	(223)	(52)	(77)
	6/30/2014	8	4	383	1,305	315	453
	6/30/2013	5	0	0	0	0	0
	6/30/2012	7	1	(75)	(187)	(63)	(64)
	6/30/2011	8	1	\$119	\$270	\$100	\$92
b.	<b>Total Deferral</b>			<b>\$455</b>	<b>\$1,809</b>	<b>\$389</b>	<b>\$638</b>
c.	Market Value less Deferral (a - b)			\$7,042	\$33,191	\$5,371	\$11,885
d.	70% of Market Value of Assets			\$5,248	\$24,501	\$4,032	\$8,767
e.	130% of Market Value of Assets			\$9,746	\$45,501	\$7,487	\$16,281
f.	<b>Actuarial Value of Assets**</b>			<b>\$7,042</b>	<b>\$33,191</b>	<b>\$5,371</b>	<b>\$11,885</b>

Note: Totals may not agree due to rounding.

\*Defined Benefit portion only.

\*\*Actuarial Value of Assets can never be less than 70% or greater than 130% of the market value of assets.

## II. ACTUARIAL EXHIBITS

Calculation of Actuarial Value of Assets (Continued)							
<i>(Dollars in Millions)</i>							
	PSERS 2	LEOFF 1	LEOFF 2	WSPRS 1/2	Total		
a. Market Value at 6/30/2017	\$504	\$5,736	\$11,758	\$1,211	\$84,853		
<b>Deferred Gains and (Losses)</b>							
Plan Year Ending	Smoothing Period	Years Remaining					
6/30/2017	7	6	\$23	\$278	\$581	\$58	\$4,113
6/30/2016	6,5*	4,3*	(11)	(198)	(331)	(39)	(2,602)
6/30/2015	4,3*	1,0*	(2)	(46)	0	(9)	(503)
6/30/2014	8	4	13	273	439	52	3,411
6/30/2013	5	0	0	0	0	0	0
6/30/2012	7	1	(1)	(48)	(56)	(8)	(527)
6/30/2011	8	1	2	73	87	12	792
<b>b. Total Deferral</b>			<b>\$23</b>	<b>\$333</b>	<b>\$720</b>	<b>\$66</b>	<b>\$4,685</b>
c. Market Value less Deferral (a - b)			\$480	\$5,403	\$11,037	\$1,144	\$80,168
d. 70% of Market Value of Assets			\$353	\$4,016	\$8,230	\$848	\$59,397
e. 130% of Market Value of Assets			\$655	\$7,457	\$15,285	\$1,574	\$110,309
<b>f. Actuarial Value of Assets**</b>			<b>\$480</b>	<b>\$5,403</b>	<b>\$11,037</b>	<b>\$1,144</b>	<b>\$80,168</b>

Note: Totals may not agree due to rounding.

\*2016: PSERS 2 = 5 year smoothing period, 3 years remaining; all other plans = 6 year smoothing period, 4 years remaining. □

2015: LEOFF 2 = 3 year smoothing period, 0 years remaining; all other plans = 4 year smoothing period, 1 year remaining.

\*\*Actuarial Value of Assets can never be less than 70% or greater than 130% of the market value of assets.

Investment Gains and (Losses) for Prior Year					
<i>(Dollars in Millions)</i>					
	PERS 1	PERS 2/3*	TRS 1	TRS 2/3*	SERS 2/3*
a. 2016 Market Value**	\$7,085	\$30,437	\$5,494	\$10,853	\$4,214
b. Total Cash Flow	(567)	210	(510)	111	41
c. 2017 Market Value**	7,460	34,957	5,743	12,501	4,852
d. Actual Return (c - b - a)	\$942	\$4,311	\$759	\$1,536	\$598
e. Weighted Asset Amount	\$6,805	\$30,547	\$5,255	\$10,895	\$4,231
f. Expected Return (7.7% x e)	524	2,352	405	839	326
g. Investment Gain/(Loss) for Prior Year (d - f)	418	1,959	355	697	272
h. Dollar-Weighted Rate of Return**	13.84%	14.11%	14.44%	14.10%	14.13%

Note: Totals may not agree due to rounding.

\*Defined Benefit portion only.

\*\*Source: Washington State Investment Board.

Investment Gains and (Losses) for Prior Year (Continued)					
<i>(Dollars in Millions)</i>					
	PSERS 2	LEOFF 1	LEOFF 2	WSPRS	Total
a. 2016 Market Value**	\$399	\$5,370	\$10,162	\$1,097	\$75,110
b. Total Cash Flow	44	(359)	113	(39)	(956)
c. 2017 Market Value**	502	5,736	11,720	1,210	84,680
d. Actual Return (c - b - a)	\$59	\$725	\$1,445	\$151	\$10,526
e. Weighted Asset Amount	\$420	\$5,193	\$10,219	\$1,078	\$74,643
f. Expected Return (7.7% x e)*	32	400	766	83	5,727
g. Investment Gain/(Loss) for Prior Year (d - f)	27	325	678	68	4,799
h. Dollar-Weighted Rate of Return**	14.15%	13.95%	14.14%	14.03%	14.10%

Note: Totals may not agree due to rounding.

\*Source: Washington State Investment Board.

\*\*The expected return for LEOFF 2 is (7.50% x e).



## Funded Status

In our actuarial valuation report, we calculate a plan's funded status by comparing (a) the plan's current assets, determined under an asset valuation method, to (b) the actuarial accrued liability of its members calculated under an actuarial cost method. Funded status can vary significantly from plan to plan, depending on the purpose of the measurement and the assumptions and methods used to determine the funded status.

Based on the purpose of the measurement, actuaries can select from several acceptable actuarial cost methods when measuring a plan's funded status. The cost methods vary in the manner they allocate benefits to past and future time periods. Generally speaking, benefits allocated to past service are considered accrued (or earned). Please see the [Glossary](#) on our website for an explanation of the actuarial cost methods we use in this actuarial valuation.

Consistent with financial reporting under Governmental Accounting Standards Board (GASB) requirements, we report funded status using the EAN actuarial cost method. However, the funded status measures we share in this report may still vary from those presented in the Department of Retirement Systems (DRS) Comprehensive Annual Financial Report. These differences occur because the assumptions and methods that apply for determining contribution requirements (under a funding valuation) may not apply for financial reporting under GASB accounting standards (an accounting valuation). Put another way, these measurements still represent distinct measurements for specific purposes and the results may vary between the two reports.

To determine the present value (today's value) of accrued benefits we discount future benefits to the valuation date using the valuation interest rate. This rate is intended to be consistent with the long-term expected return under the plan's funding policy. For all plans with the exception of the LEOFF Plan 2, the valuation interest rate is prescribed by the PFC and is subject to revision by the Legislature. For LEOFF Plan 2, the valuation interest rate is prescribed by the LEOFF Plan 2 Retirement Board. (Note: This discount rate may vary from the rate used for financial reporting under GASB accounting standards).

In addition to the valuation interest rate, we use the same long-term assumptions to develop the funded status measure in this report as used for determining the contribution requirements of the plan. We don't expect the assumptions to match actual experience over short-term periods. However, we do expect these assumptions to reasonably approximate average annual experience over long-term periods. This measure of funded status is consistent with the state's current funding policy and financing plan for future retirement benefits.

For reporting funded status and calculating contribution requirements, we also use an asset valuation method to determine the Actuarial Value of Assets (AVA). This asset valuation method smooths the inherent volatility in the Market Value of Assets (MVA) by deferring a portion of annual investment gains or losses for a certain number of years. Investment gains and losses occur when the annual return on investments varies from the long-term assumed rate. To determine the 2017 investment gains or losses, we used an investment return assumption of 7.70 percent (7.50 percent for the LEOFF Plan 2). The AVA provides a more stable measure of the plan's assets on an ongoing basis.

With this background in mind, we display the funded status on an "actuarial value" basis for each plan in the following table. For the actuarial value basis, we use the assumed long-term rate of return and AVA consistent with the plan's funding policy.

It's also reasonable and acceptable to report funded status using other assumptions and methods. The resulting funded status will change with the use of assumptions and methods that vary from what we present in this report. Please visit the [Interactive Reports](#) page on our website for funded status measures that vary by interest rate assumptions and asset valuation methods.

## II. ACTUARIAL EXHIBITS

Funded Status on an Actuarial Value Basis*					
(Dollars in Millions)	PERS		TRS		SERS
	Plan 1	Plans 2/3	Plan 1	Plans 2/3	Plan 2/3
Accrued Liability	\$12,341	\$37,166	\$8,918	\$13,095	\$5,242
Valuation Assets	\$7,042	\$33,191	\$5,371	\$11,885	\$4,613
Unfunded Liability	\$5,299	\$3,975	\$3,547	\$1,210	\$629
<b>Funded Ratio</b>					
<b>2017</b>	<b>57%</b>	<b>89%</b>	<b>60%</b>	<b>91%</b>	<b>88%</b>
2016	56%	87%	61%	89%	87%
2015	58%	88%	64%	92%	89%
2014	61%	90%	69%	94%	91%

Note: Totals may not agree due to rounding.

\*Liabilities valued using the EAN cost method at an interest rate of 7.50%. All assets have been valued under the actuarial asset method.

Funded Status on an Actuarial Value Basis*					
(Continued)					
(Dollars in Millions)	PSERS	LEOFF		WSPRS	Total
	Plan 2	Plan 1	Plan 2	Plans 1/2	
Accrued Liability	\$506	\$4,121	\$10,160	\$1,245	\$92,792
Valuation Assets	\$480	\$5,403	\$11,037	\$1,144	\$80,168
Unfunded Liability	\$25	(\$1,282)	(\$878)	\$100	\$12,624
<b>Funded Ratio</b>					
<b>2017</b>	<b>95%</b>	<b>131%</b>	<b>109%</b>	<b>92%</b>	<b>86%</b>
2016	94%	126%	105%	91%	84%
2015	95%	125%	105%	98%	86%
2014	96%	127%	107%	100%	87%

Note: Totals may not agree due to rounding.

\*Liabilities valued using the EAN cost method at an interest rate of 7.50% (7.40% for LEOFF 2). All assets have been valued under the actuarial asset method.

Generally speaking, and under current funding policy, when a plan is less/more than 100 percent funded, we expect higher/lower contribution requirements in the near term to return the plan to a 100 percent funded status over time. A plan with a funded status above 100 percent will require future contributions if the plan has not yet accumulated sufficient assets to pay both the expected cost of benefits that have been earned today and the expected cost of benefits that will be earned by current members in the future. As of this valuation date, and under the data, assumptions and methods used for this actuarial valuation, only LEOFF Plan 1 has sufficient assets to cease ongoing contributions.

The funded status measures presented in this report are not sufficient to determine whether a plan has enough assets to terminate or settle the plan obligations.

## Actuarial Gain/Loss

The following tables display actuarial gains and losses, expressed as contribution rate changes. Actuaries use gain/loss analysis to compare actual changes to assumed changes from various sources, with respect to assets, liabilities, and salaries. We also use this analysis to determine:

- The accuracy of our valuation model and annual processing.
- Why contribution rates changed.
- The reasonableness of the actuarial assumptions.

Actuarial gains will reduce contribution rates; actuarial losses will increase contribution rates. Under a reasonable set of actuarial assumptions, actuarial gains and losses will offset over long-term experience periods.

Change in Employer and State Contribution Rate by Source			
Change in Employer Rate	PERS	TRS	SERS*
<b>2016 Contribution Rate Before Laws of 2017</b>	<b>13.50%</b>	<b>16.18%</b>	<b>14.51%</b>
Remove Rate Floor	0.00%	0.00%	0.00%
Remove Plan 1 Benefit Improvements	(0.14%)	(0.15%)	(0.14%)
Remove Prior Liability and Fixed Amortization Date Adjustment	(0.11%)	(0.77%)	(1.00%)
<b>2016 Adjusted Contribution Rate</b>	<b>13.25%</b>	<b>15.26%</b>	<b>13.37%</b>
Liability Gains/Losses	0.58%	0.95%	1.11%
Asset Gains/Losses	(0.23%)	(0.18%)	(0.02%)
Present Value of Future Salaries Gains/Losses	(1.28%)	(1.73%)	(1.23%)
Incremental Changes	0.11%	0.25%	(0.05%)
Other Gains/Losses	(0.04%)	0.04%	(0.41%)
<b>Total Change</b>	<b>(0.86%)</b>	<b>(0.67%)</b>	<b>(0.60%)</b>
<b>2017 Preliminary Contribution Rate</b>	<b>12.39%</b>	<b>14.59%</b>	<b>12.77%</b>
Increase from Applied Rate Floor	0.00%	0.00%	0.00%
Increase from Plan 1 Benefit Improvements	0.14%	0.15%	0.14%
Rate to Amortize Prior Liability**	0.02%	0.38%	0.00%
Excess Member Rate	N/A	0.00%	N/A
Laws of 2018	0.13%	0.21%	0.10%
<b>2017 Adjusted Contribution Rate</b>	<b>12.68%</b>	<b>15.33%</b>	<b>13.01%</b>

\*The SERS rate includes the UAAL rate for PERS Plan 1. The "Other Gains/Losses" category includes the "Total Change" for the PERS 1 UAAL rate in those systems.

\*\*For PERS and TRS, rates reflect an expected liability payoff date within the 2019-21 biennium. For SERS, the rate reflects an expected payoff date within the 2017-19 Biennium.

Change in Employer and State Contribution Rate by Source (Continued)			
Change in Employer Rate	PSERS*	LEOFF**	WSPRS
<b>2016 Contribution Rate Before Laws of 2017</b>	<b>12.02%</b>	<b>(10.14%)</b>	<b>24.52%</b>
Remove Rate Floor	0.00%	(0.11%)	0.00%
Remove Plan 1 Benefit Improvements	(0.14%)	N/A	N/A
Remove Prior Liability and Fixed Amortization Date Adjustment***	0.00%	0.33%	(9.25%)
<b>2016 Adjusted Contribution Rate</b>	<b>11.88%</b>	<b>(9.92%)</b>	<b>15.27%</b>
Liability Gains/Losses	0.99%	0.17%	2.65%
Asset Gains/Losses	(0.06%)	(1.33%)	(0.45%)
Present Value of Future Salaries Gains/Losses	(0.92%)	(0.22%)	(2.60%)
Incremental Changes	(0.05%)	(0.54%)	(0.32%)
Other Gains/Losses	(0.45%)	(0.36%)	0.07%
<b>Total Change</b>	<b>(0.49%)</b>	<b>(2.28%)</b>	<b>(0.65%)</b>
<b>2017 Preliminary Contribution Rate</b>	<b>11.39%</b>	<b>(12.20%)</b>	<b>14.62%</b>
Increase from Applied Rate Floor	0.00%	0.86%	0.00%
Increase from Plan 1 Benefit Improvements	0.14%	N/A	N/A
Rate to Amortize Prior Liability	0.00%	0.00%	1.32%
Excess Member Rate	N/A	N/A	6.18%
Laws of 2018	0.43%	0.02%	0.01%
<b>2017 Adjusted Contribution Rate</b>	<b>11.96%</b>	<b>(11.32%)</b>	<b>22.13%</b>

\*The PSERS rate includes the UAAL rate for PERS Plan 1. The "Other Gains/Losses" category includes the "Total Change" for the PERS 1 UAAL rate in those systems.

\*\*The LEOFF contribution rate is the state's portion for Plan 2 (20% of the Normal Cost) plus the UAAL rate for Plan 1.

\*\*\*For WSPRS, (7.93 %) of this rate is attributable to the excess member rate, and the remaining (1.32%) is attributable to prior employer liability.

## II. ACTUARIAL EXHIBITS

<b>Change in Employer and State Plan 2/3 Normal Cost Rate by Source</b>			
<b>Change in Normal Costs</b>	<b>PERS</b>	<b>TRS</b>	<b>SERS</b>
<b>2016 Normal Cost Before Laws of 2017</b>	<b>8.45%</b>	<b>8.75%</b>	<b>9.46%</b>
Remove Rate Floor	0.00%	0.00%	0.00%
Remove Prior Employer Liability	(0.11%)	(0.77%)	(1.00%)
<b>2016 Adjusted Normal Cost Rate</b>	<b>8.34%</b>	<b>7.98%</b>	<b>8.46%</b>
<b>Liabilities</b>			
Salaries	(0.11%)	(0.04%)	0.31%
Termination	(0.08%)	(0.33%)	(0.21%)
Retirement	0.02%	0.03%	0.04%
Disability	0.00%	0.00%	0.01%
Mortality	0.03%	0.03%	0.03%
Growth / Return to Work	0.68%	1.24%	0.93%
Other Liabilities	0.03%	(0.02%)	0.00%
<b>Total Liability Gains/Losses</b>	<b>0.57%</b>	<b>0.91%</b>	<b>1.11%</b>
<b>Assets*</b>			
Contributions	0.26%	0.14%	0.28%
Disbursements	(0.09%)	(0.05%)	(0.04%)
Investment Returns	(0.28%)	(0.22%)	(0.26%)
<b>Total Asset Gains/Losses</b>	<b>(0.11%)</b>	<b>(0.13%)</b>	<b>(0.02%)</b>
<b>Incremental Changes</b>			
Plan Change	0.00%	0.00%	0.00%
Method Change	0.00%	0.00%	0.00%
Assumption Change	0.00%	0.00%	0.00%
Correction Change	0.00%	0.00%	0.00%
Experience Study Change	(0.07%)	(0.07%)	(0.05%)
<b>Total Incremental Changes Gains/Losses</b>	<b>(0.07%)</b>	<b>(0.07%)</b>	<b>(0.05%)</b>
<b>Present Value of Future Salaries Gains/Losses</b>	<b>(0.80%)</b>	<b>(0.93%)</b>	<b>(1.23%)</b>
<b>Other Gains/Losses</b>	<b>(0.06%)</b>	<b>0.01%</b>	<b>(0.02%)</b>
<b>Total Change</b>	<b>(0.47%)</b>	<b>(0.21%)</b>	<b>(0.21%)</b>
<b>2017 Preliminary Normal Cost</b>	<b>7.87%</b>	<b>7.77%</b>	<b>8.25%</b>
Increase from Applied Rate Floor	0.00%	0.00%	0.00%
Rate to Amortize Prior Employer Liability**	0.02%	0.38%	0.00%
Excess Member Rate	N/A	0.00%	N/A
Laws of 2018	0.03%	0.00%	0.00%
<b>2017 Adjusted Normal Cost</b>	<b>7.92%</b>	<b>8.15%</b>	<b>8.25%</b>

\*Asset Gain/Loss performed on AVA not MVA.

\*\*For PERS and TRS, rates reflect an expected liability payoff date within the 2019-21 Biennium.

For SERS, the rate reflects an expected payoff date within the 2017-19 Biennium.

<b>Change in Employer and State Plan 2/3 Normal Cost Rate by Source</b>			
<b>(Continued)</b>			
<b>Change in Normal Costs</b>	<b>PSERS</b>	<b>LEOFF<sup>1</sup></b>	<b>WSPRS<sup>2</sup></b>
<b>2016 Normal Cost Before Laws of 2017</b>	<b>6.97%</b>	<b>3.16%</b>	<b>24.52%</b>
Remove Rate Floor	0.00%	(0.11%)	0.00%
Remove Prior Employer Liability <sup>3</sup>	0.00%	0.00%	(9.25%)
<b>2016 Adjusted Normal Cost Rate</b>	<b>6.97%</b>	<b>3.05%</b>	<b>15.27%</b>
<b>Liabilities</b>			
Salaries	0.12%	(0.10%)	1.34%
Termination	(0.18%)	0.00%	0.03%
Retirement	0.00%	0.01%	(0.07%)
Disability	0.00%	0.00%	0.03%
Mortality	0.02%	0.00%	0.10%
Growth / Return to Work	0.99%	0.36%	1.34%
Other Liabilities	0.04%	0.01%	(0.12%)
<b>Total Liability Gains/Losses</b>	<b>0.99%</b>	<b>0.28%</b>	<b>2.65%</b>
<b>Assets<sup>4</sup></b>			
Contributions	0.02%	(0.06%)	0.55%
Disbursements	(0.04%)	(0.01%)	(0.04%)
Investment Returns	(0.04%)	(0.15%)	(0.96%)
<b>Total Asset Gains/Losses</b>	<b>(0.06%)</b>	<b>(0.22%)</b>	<b>(0.45%)</b>
<b>Incremental Changes</b>			
Plan Change	0.00%	0.00%	0.29%
Method Change	0.00%	0.00%	0.00%
Assumption Change	0.00%	0.00%	(0.05%)
Correction Change	0.00%	0.00%	(0.03%)
Experience Study Change	(0.05%)	(0.30%)	(0.53%)
<b>Total Incremental Changes Gains/Losses</b>	<b>(0.05%)</b>	<b>(0.30%)</b>	<b>(0.32%)</b>
<b>Present Value of Future Salaries Gains/Losses</b>	<b>(0.92%)</b>	<b>(0.24%)</b>	<b>(2.60%)</b>
<b>Other Gains/Losses</b>	<b>(0.06%)</b>	<b>(0.01%)</b>	<b>0.07%</b>
<b>Total Change</b>	<b>(0.10%)</b>	<b>(0.49%)</b>	<b>(0.65%)</b>
<b>2017 Preliminary Normal Cost</b>	<b>6.87%</b>	<b>2.56%</b>	<b>14.62%</b>
Increase from Applied Rate Floor	0.00%	0.86%	0.00%
Rate to Amortize Prior Employer Liability	0.00%	0.00%	1.32%
Excess Member Rate	N/A	N/A	6.18%
Laws of 2018	0.33%	0.02%	0.01%
<b>2017 Adjusted Normal Cost</b>	<b>7.20%</b>	<b>3.44%</b>	<b>22.13%</b>

<sup>1</sup> The LEOFF contribution rate is the state's portion only (20% of the Plan 2 Normal Cost).

<sup>2</sup> The WSPRS normal cost contribution rate applies to Plans 1 and 2.

<sup>3</sup> For WSPRS, (7.93 %) of this rate is attributable to the excess member rate, and the remaining (1.32%) is attributable to prior employer liability.

<sup>4</sup> Asset Gain/Loss performed on AVA not MVA.

## II. ACTUARIAL EXHIBITS

<b>Change in Employer and State Plan 1 UAAL Rate by Source</b>			
<b>Change in UAAL Rate</b>	<b>PERS</b>	<b>TRS</b>	<b>SERS*</b>
<b>2016 UAAL Rate Before Laws of 2017</b>	<b>5.05%</b>	<b>7.43%</b>	<b>5.05%</b>
Remove Rate Floor	0.00%	0.00%	0.00%
Remove Plan 1 Benefit Improvements	(0.14%)	(0.15%)	(0.14%)
Fixed Amortization Date Adjustment	N/A	N/A	N/A
<b>2016 Adjusted UAAL Rate</b>	<b>4.91%</b>	<b>7.28%</b>	<b>4.91%</b>
<b>Liabilities</b>			
Salaries	0.00%	0.00%	N/A
Termination	0.00%	0.00%	N/A
Retirement	0.00%	0.00%	N/A
Disability	0.00%	0.00%	N/A
Mortality	(0.02%)	0.03%	N/A
Return to Work	0.00%	0.00%	N/A
Inflation (CPI)	0.00%	0.00%	N/A
Other Liabilities	0.03%	0.01%	N/A
<b>Total Liability Gains/Losses</b>	<b>0.01%</b>	<b>0.04%</b>	<b>N/A</b>
<b>Assets**</b>			
Contributions	0.03%	0.13%	N/A
Disbursements	(0.01%)	0.02%	N/A
Investment Returns	(0.14%)	(0.20%)	N/A
<b>Total Asset Gains/Losses</b>	<b>(0.12%)</b>	<b>(0.05%)</b>	<b>N/A</b>
<b>Incremental Changes</b>			
Plan Change	0.00%	0.00%	N/A
Method Change	0.00%	0.00%	N/A
Assumption Change	0.00%	0.00%	N/A
Correction Change	0.00%	0.02%	N/A
Experience Study Change	0.18%	0.30%	N/A
<b>Total Incremental Changes Gains/Losses</b>	<b>0.18%</b>	<b>0.32%</b>	<b>N/A</b>
<b>Present Value of Future Salaries Gains/Losses</b>	<b>(0.48%)</b>	<b>(0.80%)</b>	<b>N/A</b>
<b>Other Gains/Losses</b>	<b>0.02%</b>	<b>0.03%</b>	<b>N/A</b>
<b>Total Change</b>	<b>(0.39%)</b>	<b>(0.46%)</b>	<b>(0.39%)</b>
<b>2017 Preliminary UAAL Rate</b>	<b>4.52%</b>	<b>6.82%</b>	<b>4.52%</b>
Increase from Applied Rate Floor	0.00%	0.00%	0.00%
Increase from Plan 1 Benefit Improvements	0.14%	0.15%	0.14%
Laws of 2018	0.10%	0.21%	0.10%
<b>2017 Adjusted UAAL Rate</b>	<b>4.76%</b>	<b>7.18%</b>	<b>4.76%</b>

\*The SERS rate funds the PERS Plan 1 UAAL.

\*\*Asset Gain/Loss performed on AVA not MVA.

<b>Change in Employer and State Plan 1 UAAL Rate by Source<sup>1</sup></b>		
<b>(Continued)</b>		
<b>Change in UAAL Rate</b>	<b>PSERS<sup>2</sup></b>	<b>LEOFF<sup>3</sup></b>
<b>2016 UAAL Rate Before Laws of 2017</b>	<b>5.05%</b>	<b>(13.30%)</b>
Remove Rate Floor	0.00%	0.00%
Remove Plan 1 Benefit Improvements	(0.14%)	N/A
Fixed Amortization Date Adjustment <sup>4</sup>	N/A	0.33%
<b>2016 Adjusted UAAL Rate</b>	<b>4.91%</b>	<b>(12.97%)</b>
<b>Liabilities</b>		
Salaries	N/A	0.02%
Termination	N/A	0.00%
Retirement	N/A	0.01%
Disability	N/A	0.00%
Mortality	N/A	(0.04%)
Return to Work	N/A	0.00%
Inflation (CPI)	N/A	(0.33%)
Other Liabilities	N/A	0.23%
<b>Total Liability Gains/Losses</b>	<b>N/A</b>	<b>(0.11%)</b>
<b>Assets<sup>5</sup></b>		
Contributions	N/A	(0.02%)
Disbursements	N/A	0.00%
Investment Returns	N/A	(1.09%)
<b>Total Asset Gains/Losses</b>	<b>N/A</b>	<b>(1.11%)</b>
<b>Incremental Changes</b>		
Plan Change	N/A	0.00%
Method Change	N/A	0.00%
Assumption Change	N/A	0.00%
Correction Change	N/A	0.00%
Experience Study Change	N/A	(0.24%)
<b>Total Incremental Changes Gains/Losses</b>	<b>N/A</b>	<b>(0.24%)</b>
<b>Present Value of Future Salaries Gains/Losses</b>	<b>N/A</b>	<b>0.02%</b>
<b>Other Gains/Losses</b>	<b>N/A</b>	<b>(0.35%)</b>
<b>Total Change</b>	<b>(0.39%)</b>	<b>(1.79%)</b>
<b>2017 Preliminary UAAL Rate</b>	<b>4.52%</b>	<b>(14.76%)</b>
Increase from Applied Rate Floor	0.00%	N/A
Increase from Plan 1 Benefit Improvements	0.14%	N/A
Laws of 2018	0.10%	0.00%
<b>2017 Adjusted UAAL Rate</b>	<b>4.76%</b>	<b>(14.76%)</b>

<sup>1</sup> WSPRS does not have a UAAL rate.

<sup>2</sup> The PSERS rate funds the PERS Plan 1 UAAL.


<sup>3</sup> The LEOFF contribution rate is the UAAL rate for plan 1. The plan has a surplus of assets over liabilities, so no rate is currently payable.

<sup>4</sup> LEOFF 2 fixed amortization date is 6/30/2024.

<sup>5</sup> Asset Gain/Loss performed on AVA nto MVA.







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III. PARTICIPANT DATA



## Overview of System Membership

The state administers nine retirement systems for state and local public employees. Retirement system membership is determined according to the participant’s occupation and employer. Employees covered by each system are defined in separate chapters of the Revised Code of Washington.

In addition to the six systems described below, the state also administers benefits for volunteer fire fighters and two small judicial systems, which are not included in this valuation. The volunteer fire fighters have a separate actuarial valuation. The judicial systems are closed to new members, and any judge hired after June 30, 1988, becomes a member of the Public Employees’ Retirement System Plans 2/3.

<p><b>PERS</b> - Public Employees' Retirement System <i>Chapter 41.40 RCW</i></p>	<p>State employees; employees of all counties and most cities (some exceptions are Tacoma, Seattle, and Spokane); non-teaching employees of institutions of higher learning and community colleges; employees of ports, service districts, Energy Northwest, public utility districts, and judges first elected or appointed after June 30, 1988.</p>
<p><b>TRS</b> - Teachers' Retirement System <i>Chapter 41.32 RCW</i></p>	<p>Certificated teachers; administrators; and educational staff associates.</p>
<p><b>SERS</b> - School Employees' Retirement System <i>Chapter 41.35 RCW</i></p>	<p>Classified school district employees and educational service district employees.</p>
<p><b>PSERS</b> - Public Safety Employees' Retirement System <i>Chapter 41.37 RCW</i></p>	<p>Correction officers (state, state community, county, city, and local community); state park rangers; enforcement officers with the Liquor and Cannabis Board, Washington State Patrol (commercial vehicle), Gambling Commission, and the Department of Natural Resources.</p>
<p><b>LEOFF</b> - Law Enforcement Officers' and Fire Fighters' Retirement System <i>Chapter 41.26 RCW</i></p>	<p>Fire fighters; emergency medical technicians; law enforcement officers including sheriffs; university, port, city police officers, and enforcement officers with the Department of Fish and Wildlife.</p>
<p><b>WSPRS</b> - Washington State Patrol Retirement System <i>Chapter 43.43 RCW</i></p>	<p>Commissioned officers of the Washington State Patrol.</p>

Beginning with the 2015 valuation period, OSA performed valuations for certain retirement provisions under Higher Education Retirement Plans. These plans are offered to certain employees of colleges and universities in Washington and are not administered by the Department of Retirement Systems. The results of these valuations are provided in separate reports.

### III. PARTICIPANT DATA

Active Membership By Employer and Plan as of June 30, 2017							
Employer	All	PERS			TRS		
	Systems	Plan 1	Plan 2	Plan 3	Plan 1	Plan 2	Plan 3
State Agencies	62,510	787	44,244	13,015	5	29	48
Higher Education	23,124	265	14,703	7,738	5	5	290
Community Colleges	6,471	92	4,292	1,642	24	39	382
K-12	131,184	687	0	0	661	18,561	52,745
Counties	35,332	389	24,666	5,107	0	0	0
County Sub Divisions	14,231	112	10,911	2,789	0	0	0
First Class Cities	8,570	45	2,584	654	0	0	0
Other Cities	18,514	125	11,067	2,243	0	0	0
Ports	2,587	25	1,948	424	0	0	0
Education Service District	2,122	12	0	0	3	82	225
Fire Districts	4,777	4	733	119	0	0	0
Public Utility District	4,774	29	4,117	628	0	0	0
Water Districts	2,158	22	1,873	263	0	0	0
Energy Northwest	1,119	2	796	321	0	0	0
Unions	1	1	0	0	0	0	0
Charter Schools	176	0	0	0	0	26	85
Tribal Compact Schools	27	0	0	0	0	5	5
<b>Total</b>	<b>317,677</b>	<b>2,597</b>	<b>121,934</b>	<b>34,943</b>	<b>698</b>	<b>18,747</b>	<b>53,780</b>

Active Membership By Employer and Plan as of June 30, 2017 (Continued)							
Employer	SERS		PSERS	LEOFF		WSPRS	
	Plan 2	Plan 3	Plan 2	Plan 1	Plan 2	Plan 1	Plan 2
State Agencies	0	0	3,238	0	134	464	546
Higher Education	0	0	0	0	118	0	0
Community Colleges	0	0	0	0	0	0	0
K-12	25,773	32,757	0	0	0	0	0
Counties	0	0	2,275	6	2,889	0	0
County Sub Divisions	0	0	129	0	290	0	0
First Class Cities	0	0	30	22	5,235	0	0
Other Cities	0	0	150	8	4,921	0	0
Ports	0	0	0	1	189	0	0
Education Service District	888	912	0	0	0	0	0
Fire Districts	0	0	0	3	3,918	0	0
Public Utility District	0	0	0	0	0	0	0
Water Districts	0	0	0	0	0	0	0
Energy Northwest	0	0	0	0	0	0	0
Unions	0	0	0	0	0	0	0
Charter Schools	24	41	0	0	0	0	0
Tribal Compact Schools	12	5	0	0	0	0	0
<b>Total</b>	<b>26,697</b>	<b>33,715</b>	<b>5,822</b>	<b>40</b>	<b>17,694</b>	<b>464</b>	<b>546</b>

The following tables show participant data changes from last year's valuation to this year's valuation. We divide the participant data into two main categories:

**Actives** — members accruing benefits in the plan

**Annuitants** — members and beneficiaries receiving benefits from the plan.

Reconciliation of Active and Annuitant Data								
	PERS				TRS			
	Plan 1	Plan 2	Plan 3	Total	Plan 1	Plan 2	Plan 3	Total
<b>2016 Actives</b>	3,227	119,677	33,240	156,144	967	17,242	52,706	70,915
Transfers	0	(257)	5,383	5,126	0	(187)	3,036	2,849
Hires/Rehires	47	13,663	805	14,515	15	3,338	1,975	5,328
New Retirees	(619)	(3,043)	(387)	(4,049)	(270)	(246)	(779)	(1,295)
Deaths	(8)	(222)	(33)	(263)	(3)	(12)	(39)	(54)
Terminations	(50)	(7,884)	(4,065)	(11,999)	(11)	(1,388)	(3,119)	(4,518)
<b>2017 Actives</b>	<b>2,597</b>	<b>121,934</b>	<b>34,943</b>	<b>159,474</b>	<b>698</b>	<b>18,747</b>	<b>53,780</b>	<b>73,225</b>
<b>2016 Annuitants</b>	49,268	42,591	3,684	95,543	34,787	4,687	8,843	48,317
New Retirees	835	4,585	599	6,019	302	425	1,425	2,152
Annuitant Deaths	(2,307)	(944)	(54)	(3,305)	(1,137)	(69)	(60)	(1,266)
New Survivors	322	314	36	672	205	18	62	285
Other	(7)	(9)	(3)	(19)	(6)	(1)	(6)	(13)
<b>2017 Annuitants</b>	<b>48,111</b>	<b>46,537</b>	<b>4,262</b>	<b>98,910</b>	<b>34,151</b>	<b>5,060</b>	<b>10,264</b>	<b>49,475</b>
<b>Ratio Actives to Annuitants</b>	<b>0.05</b>	<b>2.62</b>	<b>8.20</b>	<b>1.61</b>	<b>0.02</b>	<b>3.70</b>	<b>5.24</b>	<b>1.48</b>

Reconciliation of Active and Annuitant Data (Continued)				
	SERS			PSERS
	Plan 2	Plan 3	Total	Plan 2
<b>2016 Actives</b>	25,950	32,314	58,264	5,483
Transfers	(412)	4,499	4,087	0
Hires/Rehires	4,152	681	4,833	895
New Retirees	(570)	(628)	(1,198)	(53)
Deaths	(39)	(47)	(86)	(4)
Terminations	(2,384)	(3,104)	(5,488)	(499)
<b>2017 Actives</b>	<b>26,697</b>	<b>33,715</b>	<b>60,412</b>	<b>5,822</b>
<b>2016 Annuitants</b>	7,380	6,708	14,088	108
New Retirees	927	1,050	1,977	60
Annuitant Deaths	(145)	(86)	(231)	(1)
New Survivors	54	57	111	0
Other	0	(4)	(4)	0
<b>2017 Annuitants</b>	<b>8,216</b>	<b>7,725</b>	<b>15,941</b>	<b>167</b>
<b>Ratio Actives to Annuitants</b>	<b>3.25</b>	<b>4.36</b>	<b>3.79</b>	<b>34.86</b>

Reconciliation of Active and Annuitant Data (Continued)							
	LEOFF			WSPRS			All
	Plan 1	Plan 2	Total	Plan 1	Plan 2	Total	Systems
<b>2016 Actives</b>	62	17,186	17,248	498	470	968	309,022
Transfers	0	0	0	0	0	0	12,062
Hires/Rehires	1	1,372	1,373	0	85	85	27,029
New Retirees	(23)	(518)	(541)	(34)	0	(34)	(7,170)
Deaths	0	(17)	(17)	0	(1)	(1)	(425)
Terminations	0	(329)	(329)	0	(8)	(8)	(22,841)
<b>2017 Actives</b>	<b>40</b>	<b>17,694</b>	<b>17,734</b>	<b>464</b>	<b>546</b>	<b>1,010</b>	<b>317,677</b>
<b>2016 Annuitants</b>	7,378	4,259	11,637	1,078	0	1,078	170,771
New Retirees	24	603	627	37	0	37	10,872
Annuitant Deaths	(277)	(26)	(303)	(19)	0	(19)	(5,125)
New Survivors	105	24	129	17	0	17	1,214
Other	(2)	(9)	(11)	0	0	0	(47)
<b>2017 Annuitants</b>	<b>7,228</b>	<b>4,851</b>	<b>12,079</b>	<b>1,113</b>	<b>0</b>	<b>1,113</b>	<b>177,685</b>
<b>Ratio Actives to Annuitants</b>	<b>0.01</b>	<b>3.65</b>	<b>1.47</b>	<b>0.42</b>	<b>N/A</b>	<b>0.91</b>	<b>1.79</b>

### III. PARTICIPANT DATA

## Summary of Plan Participants

Summary of Plan Participants								
PERS	2017				2016			
	Plan 1	Plan 2	Plan 3	Total	Plan 1	Plan 2	Plan 3	Total
<b>Active Members</b>								
Number	2,597	121,934	34,943	159,474	3,227	119,677	33,240	156,144
Total Salaries (Dollars in Millions)	\$163	\$7,926	\$2,090	\$10,179	\$197	\$7,570	\$1,932	\$9,699
Average Age	65.1	47.9	43.3	47.2	64.3	48.1	43.3	47.4
Average Service	25.7	12.1	8.4	11.5	25.5	12.4	8.5	11.8
Average Salary	\$62,610	\$65,002	\$59,809	\$63,825	\$61,171	\$63,249	\$58,110	\$62,112
<b>Terminated Members</b>								
Vested	660	27,796	5,598	34,054	830	27,430	5,239	33,499
Non-Vested	3,018	107,483	0	110,501	3,199	104,588	0	107,787
<b>Total Terminated</b>	<b>3,678</b>	<b>135,279</b>	<b>5,598</b>	<b>144,555</b>	<b>4,029</b>	<b>132,018</b>	<b>5,239</b>	<b>141,286</b>
<b>Annuitants</b>								
Service Retired*	41,709	41,629	3,919	87,257	42,711	37,913	3,371	83,995
Disability Retired	867	1,917	89	2,873	926	1,900	93	2,919
Survivors	5,535	2,991	254	8,780	5,631	2,778	220	8,629
<b>Total Annuitants</b>	<b>48,111</b>	<b>46,537</b>	<b>4,262</b>	<b>98,910</b>	<b>49,268</b>	<b>42,591</b>	<b>3,684</b>	<b>95,543</b>
Avg Monthly Benefit, All Annuitants	\$2,048	\$1,592	\$890	\$1,783	\$2,008	\$1,517	\$867	\$1,745
Number of New Service Retirees	819	4,481	591	5,891	919	4,333	505	5,757
Avg. Benefit, New Service Retirees	\$2,390	\$2,113	\$1,001	\$2,040	\$2,290	\$1,975	\$1,069	\$1,946

\*Includes retirements from active and terminated with vested status.

Summary of Plan Participants (Continued)								
TRS	2017				2016			
	Plan 1	Plan 2	Plan 3	Total	Plan 1	Plan 2	Plan 3	Total
<b>Active Members</b>								
Number	698	18,747	53,780	73,225	967	17,242	52,706	70,915
Total Salaries (Dollars in Millions)	\$61	\$1,244	\$4,196	\$5,501	\$81	\$1,104	\$3,947	\$5,132
Average Age	66.1	41.7	46.2	45.2	65.3	41.9	46.2	45.4
Average Service	32.3	7.7	14.1	12.6	31.8	7.9	14.0	12.8
Average Salary	\$87,446	\$66,374	\$78,023	\$75,130	\$83,405	\$64,055	\$74,892	\$72,373
<b>Terminated Members</b>								
Vested	187	2,612	8,914	11,713	217	2,532	8,718	11,467
Non-Vested	311	6,300	0	6,611	343	5,847	0	6,190
<b>Total Terminated</b>	<b>498</b>	<b>8,912</b>	<b>8,914</b>	<b>18,324</b>	<b>560</b>	<b>8,379</b>	<b>8,718</b>	<b>17,657</b>
<b>Annuitants</b>								
Service Retired*	30,776	4,778	9,748	45,302	31,382	4,420	8,388	44,190
Disability Retired	509	82	86	677	538	82	85	705
Survivors	2,866	200	430	3,496	2,867	185	370	3,422
<b>Total Annuitants</b>	<b>34,151</b>	<b>5,060</b>	<b>10,264</b>	<b>49,475</b>	<b>34,787</b>	<b>4,687</b>	<b>8,843</b>	<b>48,317</b>
Avg Monthly Benefit, All Annuitants	\$2,178	\$1,924	\$1,139	\$1,936	\$2,150	\$1,864	\$1,093	\$1,929
Number of New Service Retirees	302	418	1,406	2,126	445	427	1,393	2,265
Avg. Benefit, New Service Retirees	\$3,223	\$2,365	\$1,380	\$1,835	\$3,081	\$2,259	\$1,277	\$1,816

\*Includes retirements from active and terminated with vested status.

Summary of Plan Participants (Continued)						
SERS	2017			2016		
	Plan 2	Plan 3	Total	Plan 2	Plan 3	Total
<b>Active Members</b>						
Number	26,697	33,715	60,412	25,950	32,314	58,264
Total Salaries (Dollars in Millions)	\$885	\$1,127	\$2,012	\$817	\$1,043	\$1,860
Average Age	49.8	49.5	49.6	49.9	50.0	50.0
Average Service	9.1	9.9	9.5	9.3	10.3	9.9
Average Salary	\$33,153	\$33,436	\$33,311	\$31,493	\$32,269	\$31,923
<b>Terminated Members</b>						
Vested	5,914	8,403	14,317	5,724	7,951	13,675
Non-Vested	13,740	0	13,740	12,205	0	12,205
<b>Total Terminated</b>	<b>19,654</b>	<b>8,403</b>	<b>28,057</b>	<b>17,929</b>	<b>7,951</b>	<b>25,880</b>
<b>Annuitants</b>						
Service Retired*	7,566	7,356	14,922	6,773	6,395	13,168
Disability Retired	262	92	354	262	88	350
Survivors	388	277	665	345	225	570
<b>Total Annuitants</b>	<b>8,216</b>	<b>7,725</b>	<b>15,941</b>	<b>7,380</b>	<b>6,708</b>	<b>14,088</b>
Avg Monthly Benefit, All Annuitants	\$879	\$480	\$686	\$859	\$467	\$672
Number of New Service Retirees	911	1,033	1,944	869	970	1,839
Avg. Benefit, New Service Retirees	\$978	\$537	\$744	\$921	\$501	\$699

\*Includes retirements from active and terminated with vested status.

Summary of Plan Participants (Continued)		
PSERS	2017	2016
	Plan 2	Plan 2
<b>Active Members</b>		
Number	5,822	5,483
Total Salaries (Dollars in Millions)	\$362	\$327
Average Age	40.1	40.2
Average Service	6.0	5.7
Average Salary	\$62,247	\$59,700
<b>Terminated Members</b>		
Vested	468	393
Non-Vested	2,240	1,947
<b>Total Terminated</b>	<b>2,708</b>	<b>2,340</b>
<b>Annuitants</b>		
Service Retired*	148	94
Disability Retired	13	8
Survivors	6	6
<b>Total Annuitants</b>	<b>167</b>	<b>108</b>
Avg Monthly Benefit, All Annuitants	\$745	\$584
Number of New Service Retirees	54	27
Avg. Benefit, New Service Retirees	\$1,063	\$887

\*Includes retirements from active and terminated with vested status.

### III. PARTICIPANT DATA

Summary of Plan Participants (Continued)						
LEOFF	2017			2016		
	Plan 1	Plan 2	Total	Plan 1	Plan 2	Total
<b>Active Members</b>						
Number	40	17,694	17,734	62	17,186	17,248
Total Salaries (Dollars in Millions)	\$5	\$1,879	\$1,883	\$7	\$1,786	\$1,793
Average Age	65.8	43.2	43.3	64.5	43.5	43.6
Average Service	41.1	14.2	14.3	40.4	14.5	14.6
Average Salary	\$114,135	\$106,169	\$106,187	\$108,061	\$103,947	\$103,962
<b>Terminated Members</b>						
Vested	0	863	863	1	953	954
Non-Vested	29	1,917	1,946	31	1,806	1,837
<b>Total Terminated</b>	<b>29</b>	<b>2,780</b>	<b>2,809</b>	<b>32</b>	<b>2,759</b>	<b>2,791</b>
<b>Annuitants</b>						
Service Retired*	2,462	4,200	6,662	2,512	3,660	6,172
Disability Retired	3,128	409	3,537	3,240	379	3,619
Survivors	1,638	242	1,880	1,626	220	1,846
<b>Total Annuitants</b>	<b>7,228</b>	<b>4,851</b>	<b>12,079</b>	<b>7,378</b>	<b>4,259</b>	<b>11,637</b>
Avg Monthly Benefit, All Annuitants	\$4,181	\$3,894	\$4,066	\$4,063	\$3,726	\$3,939
Number of New Service Retirees**	24	572	596	20	523	543
Avg. Benefit, New Service Retirees**	\$8,455	\$4,798	\$4,945	\$8,065	\$4,632	\$4,759

\*Includes retirements from active and terminated with vested status.

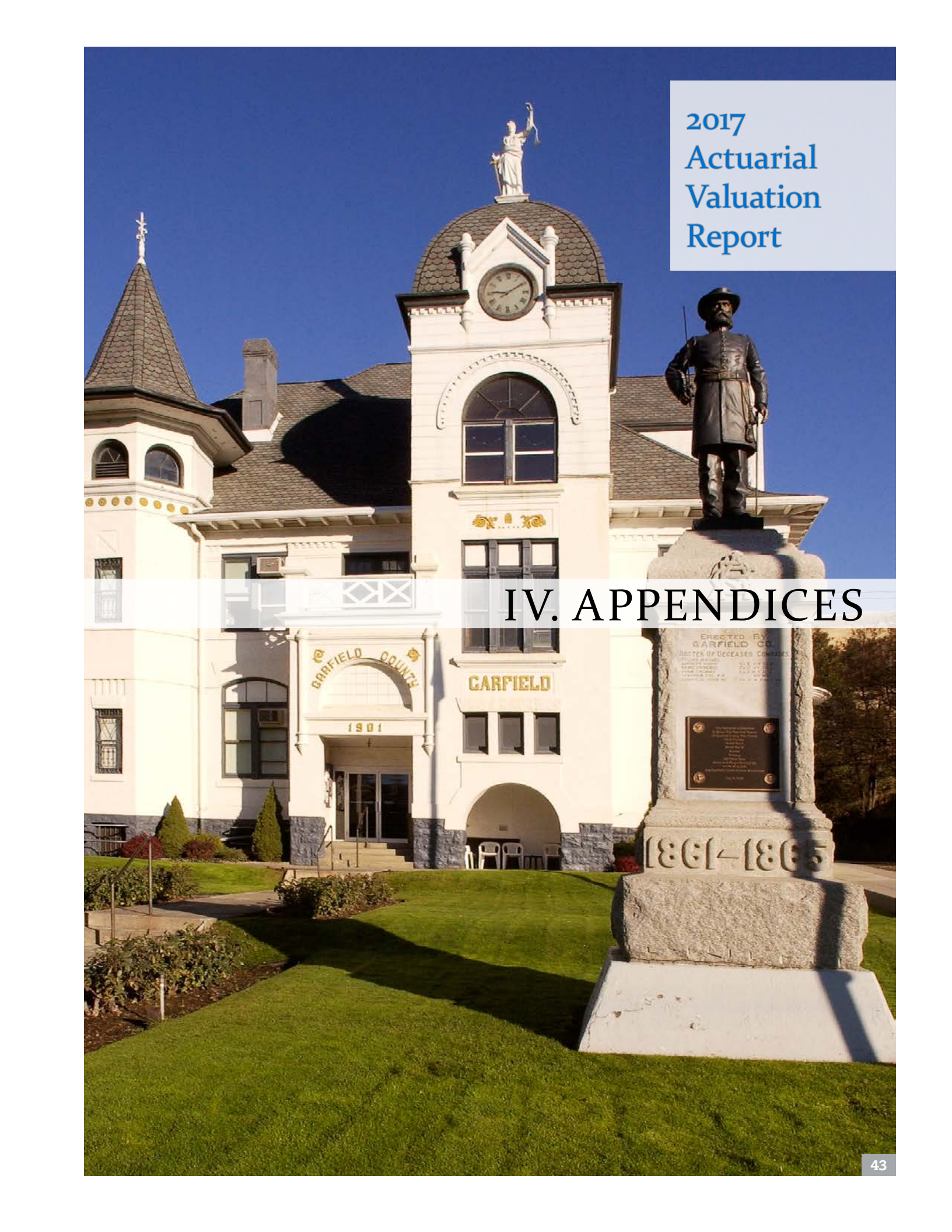
\*\*Includes disabled retirees for Plan 1 only.

Summary of Plan Participants (Continued)						
WSPRS	2017			2016		
	Plan 1	Plan 2	Total	Plan 1	Plan 2	Total
<b>Active Members</b>						
Number	464	546	1,010	498	470	968
Total Salaries (Dollars in Millions)	\$48	\$45	\$93	\$47	\$36	\$83
Average Age	48.2	33.7	40.4	47.5	33.9	40.9
Average Service	21.4	7.3	13.8	20.7	7.4	14.2
Average Salary	\$102,624	\$82,863	\$91,941	\$93,338	\$77,349	\$85,575
<b>Terminated Members</b>						
Vested	73	31	104	76	28	104
Non-Vested	17	53	70	17	53	70
Disability Retired*	42	0	42	46	0	46
<b>Total Terminated</b>	<b>132</b>	<b>84</b>	<b>216</b>	<b>139</b>	<b>81</b>	<b>220</b>
<b>Retirees</b>						
Service Retired**	939	0	939	918	0	918
Survivors	174	0	174	160	0	160
<b>Total Annuitants</b>	<b>1,113</b>	<b>0</b>	<b>1,113</b>	<b>1,078</b>	<b>0</b>	<b>1,078</b>
Avg Monthly Benefit, All Annuitants	\$4,287	\$0	\$4,287	\$4,215	\$0	\$4,215
Number of New Service Retirees	37	0	37	56	0	56
Avg. Benefit, New Service Retirees	\$4,389	\$0	\$4,389	\$4,652	\$0	\$4,652

\*Benefits provided outside of pension funds.

\*\*Includes retirements from active and terminated with vested status.



The image shows the Garfield County Courthouse, a large, ornate, light-colored building with a central clock tower topped by a statue of Justice. To the right of the courthouse is a large stone monument featuring a bronze statue of a man in military uniform. The monument has an inscription and the dates 1861-1865. The scene is set against a clear blue sky with a green lawn in the foreground.

2017  
Actuarial  
Valuation  
Report

IV. APPENDICES



## Actuarial Methods and Assumptions

To calculate the contribution rates necessary to pre-fund a plan's benefits, an actuary uses an actuarial cost method, an asset valuation method, economic assumptions, and demographic assumptions. This section, together with the web pages linked below, lists the actuarial methods and assumptions used for this valuation.

### Actuarial Methods

Please see the [Actuarial Methods](#) web page for descriptions of the actuarial cost methods and asset valuation method we use for this valuation.

### Actuarial Assumptions

This section lists the assumptions that change regularly, along with new assumption and method changes since the last actuarial valuation report. Please see the [Actuarial Assumptions](#) web page for descriptions of all remaining assumptions.

#### *Economic Assumptions*

We adjust the general salary growth assumption for TRS each year to model the salary bonus payable to members who attain national board certification. These bonuses are includable in compensation for pension purposes.

TRS General Salary Increase by Year		
Year	TRS 1	TRS 2/3
2017	3.50%	3.50%
2018	3.60%	3.60%
2019	3.59%	3.59%
2020	3.58%	3.58%
2021	3.58%	3.57%
2022	3.57%	3.57%
2023	3.56%	3.56%
2024	3.55%	3.55%
2025	3.54%	3.54%
2026	3.53%	3.53%
2027	3.52%	3.52%
2028	3.52%	3.52%
2029+	3.50%	3.50%

*Note: Includes inflation.*

#### *Demographic Assumptions*

We make an assumption to help us project the value of accumulated employee contributions with interest if a member elects a refund of contributions instead of a deferred retirement allowance upon termination.

PERS 1 and TRS 1 member rates are set in statute at six percent. No LEOFF 1 rates are required as long as the plan remains fully funded. Plan 3 members do not contribute to the defined benefit plan.

Member Contribution Rates for Savings Fund Accrual	
System/Plans	Contribution Rate
PERS 2	5.44%
TRS 2	6.42%
SERS 2	5.70%
PSERS 2	7.01%
LEOFF 2	8.79%
WSPRS 1/2	8.44%

## Changes in Methods and Assumptions since the Last Valuation

- We updated our valuation interest rate, general salary growth, and inflation assumptions to be consistent with the assumptions adopted by the Pension Funding Council and the Law Enforcement Officers' and Fire Fighters' (LEOFF) Plan 2 Board.
  - We lowered the valuation interest rate from 7.70 to 7.50 percent for all systems except LEOFF 2. For LEOFF 2, we lowered the valuation interest rate from 7.50 to 7.40 percent.
  - We lowered assumed general salary growth from 3.75 to 3.50 percent for all systems.
  - We lowered assumed inflation from 3.00 to 2.75 percent for all systems.
- We updated our Washington State Patrol Retirement System (WSPRS) salary assumptions to model legislation enacted during the 2017 Legislative Session (C181 L17). This law allows a certain amount of voluntary overtime to be included in salaries for purposes of calculating retirement benefits in WSPRS. To reflect this law, we increased the WSPRS assumed salary growth for 2017 from 11.0 percent to 13.4 percent for all active members in the system.
- We modified how our valuation software calculates benefits paid to remarried duty-related death survivors of LEOFF 2 and WSPRS members.
- We improved how we model minimum benefits paid to Teachers' Retirement System Plan 1 annuitants in the case where the member had elected a reduced annuity upon retirement.
- We updated the trend that our valuation software uses to project medical inflation for LEOFF 2 and WSPRS survivors of a duty-related death, and for certain LEOFF 2 medical-related duty disability benefits. For additional information on this medical trend, see our [2017 Other Post-Employment Benefits Actuarial Valuation Report](#).

## Summary of Plan Provisions

The summary of key plan provisions used in the actuarial valuation are provided in two sets of tables. The tables below contain plan provisions that can change frequently while the provisions that change less frequently can be found on the [Summary of General Plan Provisions](#) page of our website.

Summary of Frequently Changing Plan Provisions - PERS			
	Plan 1	Plan 2	Plan 3
<b>COLA</b>	\$2.39 per month/YOS* on 7/1/18	Lesser of CPI** or 3%	Lesser of CPI** or 3%
<b>Minimum Benefit per Month</b>	\$59.89* per YOS on 7/1/18, \$1,900.15* for select annuitants	N/A	N/A
<b>Material Plan Provision Changes Since Last Valuation</b>	One-Time Plan 1 COLA Increase (C 151 L 18)	PSERS Membership for Nursing/Custody/Safety (C 241 L 18)	PSERS Membership for Nursing/Custody/Safety (C 241 L 18)
<b>Material Benefits not Included in this Valuation</b>	None	Portability with first class cities***	Portability with first class cities***

\*Minimum COLA payable to qualified members only; increases by 3% annually. The Uniform COLA was removed under C 362 L 11.

\*\*CPI: Urban Wage Earners & Clerical Workers, Seattle-Tacoma-Bremerton, WA - All Items.

\*\*\*Data is not available to assess the amount of liability or whether these portability benefits are material.

Summary of Frequently Changing Plan Provisions - TRS			
	Plan 1	Plan 2	Plan 3
<b>COLA</b>	\$2.39 per month/YOS* on 7/1/18	Lesser of CPI** or 3%	Lesser of CPI** or 3%
<b>Minimum Benefit per Month</b>	\$59.89* per YOS on 7/1/18, \$1,900.15* for select annuitants	N/A	N/A
<b>Changes in Plan Provisions Since Last Valuation</b>	One-Time Plan 1 COLA Increase (C 151 L 18)	None	None
<b>Material Benefits not Included in this Valuation</b>	None	None	None

\*Minimum COLA payable to qualified members only; increases by 3% annually. The Uniform COLA was removed under C 362 L 11.

\*\*CPI: Urban Wage Earners & Clerical Workers, Seattle-Tacoma-Bremerton, WA - All Items.

Summary of Frequently Changing Plan Provisions - SERS		
	Plan 2	Plan 3
<b>COLA</b>	Lesser of CPI* or 3%	Lesser of CPI* or 3%
<b>Minimum Benefit per Month per YOS</b>	N/A	N/A
<b>Material Plan Provision Changes Since Last Valuation</b>	None	None
<b>Material Benefits not Included in this Valuation</b>	None	None

\*CPI: Urban Wage Earners & Clerical Workers, Seattle-Tacoma-Bremerton, WA - All Items.

Summary of Frequently Changing Plan Provision - PSERS	
	Plan 2
<b>COLA</b>	Lesser of CPI* or 3%
<b>Minimum Benefit per Month per YOS</b>	N/A
<b>Material Plan Provision Changes Since Last Valuation</b>	PSERS Membership for Nursing/Custody/Safety (C 241 L 18)
<b>Material Benefits not Included in this Valuation</b>	None

\*CPI: Urban Wage Earners & Clerical Workers, Seattle-Tacoma-Bremerton, WA - All Items.

Summary of Frequently Changing Plan Provisions - LEOFF		
	Plan 1	Plan 2
<b>COLA</b>	Full CPI*	Lesser of CPI* or 3%
<b>Minimum Benefit per Month per YOS</b>	N/A	N/A
<b>Material Plan Provision Changes Since Last Valuation</b>	None	PTSD Occupational Disease (C 264 L 18)
<b>Material Benefits not Included in this Valuation</b>	None	None

\*CPI: Urban Wage Earners & Clerical Workers, Seattle-Tacoma-Bremerton, WA - All Items.

## IV. APPENDICES

<b>Summary of Frequently Changing Plan Provision - WSPRS</b>		
	<b>Plan 1</b>	<b>Plan 2</b>
<b>COLA</b>	Lesser of CPI* or 3%	Lesser of CPI* or 3%
<b>Minimum Benefit per Month per YOS**</b>	\$35.93 on 1/1/18	\$35.93 on 1/1/18
<b>Material Plan Provision Changes Since Last Valuation</b>	None	None
<b>Material Benefits not Included in this Valuation</b>	None	None

\*CPI: Urban Wage Earners & Clerical Workers, Seattle-Tacoma-Bremerton, WA - All Items.

\*\*Amount increases by 3% annually.

These tables present high-level summaries and are not meant to be exhaustive lists. For complete details of plan provisions, please refer to the statutes governing the systems or contact the plan administrator, DRS. In the unlikely event that information contained in these summary tables conflicts with state law, the law takes precedence.

## [The Office of the State Actuary's Website](#)

Our website ([leg.wa.gov/osa](http://leg.wa.gov/osa)) contains additional information and educational material not included in this report. The site also contains an archive of prior Actuarial Valuation Reports and other recent studies that OSA has produced. The following is a list of materials found on our website that could be useful to the reader.

### [Glossary](#)

Definitions for frequently used actuarial and pension terms.

### [Age Distributions](#)

Tables summarizing valuation statistics by system, plan, and member/annuitant age.

### [Historical Data](#)

Tables summarizing valuation statistics by retirement system and valuation period.

### [Prior Actuarial Valuation Reports](#)

Archive of valuations over the past several years.

### [2017 Report on Financial Condition and Economic Experience Study](#)

Report examining the financial health of the retirement systems and long-term economic assumptions.

### [2007-2012 Demographic Experience Study](#)

Most recent report examining demographic behavior within each of the retirement systems.

### [2016 Risk Assessment](#)

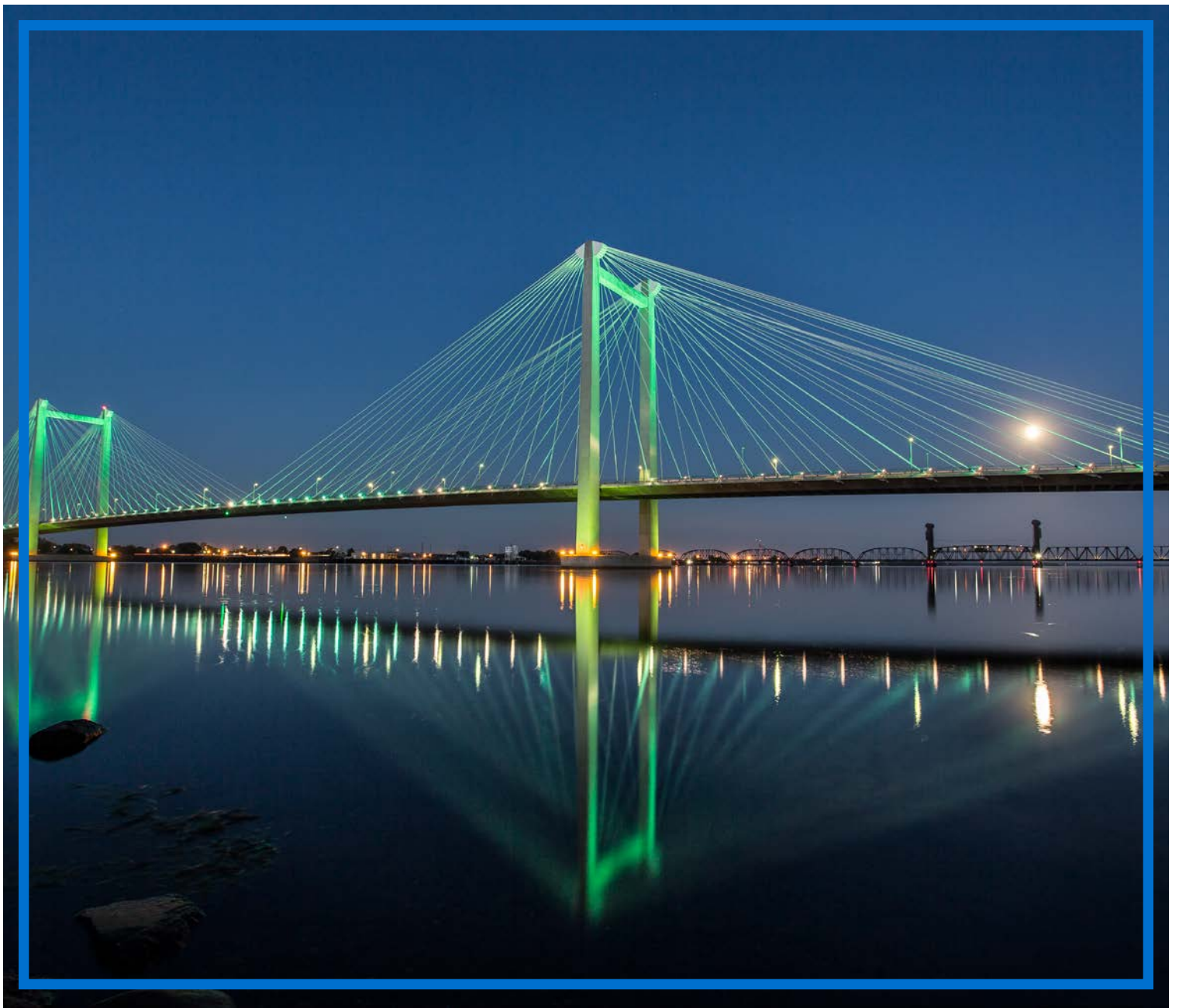
Information examining the effect of unexpected experience on the retirement systems.

### [Contribution Rate Projections](#)

Forecasts for future contribution rates based on projected assets and liabilities.

### [Interactive Reports](#)

Set of reports displaying funded status, projected benefit payments, and contribution rates that vary by key inputs the user selects.



WASHINGTON STATE

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# 2017 Actuarial Valuation

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