2021

ACTUARIAL VALUATION REPORT

Law Enforcement Officers' and Firefighters' Plan 2 Retirement Board

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2021

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Law Enforcement Officers' and Firefighters' Plan 2 Retirement Board

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Law Enforcement Officers' and Fire Fighters'
Retirement System Plan 2
Actuarial Valuation Report as of June 30, 2021

November 2022

As required under Chapter 41.45 of the Revised Code of Washington (RCW), this report documents the results of an actuarial valuation of the Law Enforcement Officers' and Fire Fighters' Retirement System Plan 2 (LEOFF 2).

The primary purpose of this valuation is to determine contribution requirements for LEOFF 2 for the 2023-2025 Biennium based on a June 30, 2021, measurement date and under the funding policy established by the Board and Legislature. This valuation also provides information on the funding progress and developments in the plans over the past two years.

This report is organized into five sections.

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

The **Summary of Key Results** section provides a high-level summary of the valuation results and commentary on risk. The **Actuarial Exhibits** and **Participant Data** sections of the report provide detailed actuarial asset and liability information and participant data. The **Appendices** provide access to a summary of the principal actuarial assumptions and methods, major plan provisions, and additional information used to prepare this valuation. The **Resources** section outlines additional supplemental information found on our website.

We encourage you to submit any questions you might have concerning this report to our e-mail address at state.actuary@leg.wa.gov. We also invite you to visit our website, for further information regarding the actuarial funding of the Washington State retirement systems.

Sincerely,

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

Michael T. Harbour, ASA, MAAA
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SECTION I.

SUMMARY OF KEY RESULTS

Intended Use

The purpose of this report is to develop contribution rates required to fund LEOFF Plan 2 for the 2023-25 Biennium based on a June 30, 2021, measurement date, and the funding policy described in this section. We modified the report to provide information on contribution rates, funding progress, and developments in the plan over the past two years, i.e., from the prior to current rate-setting valuation. We believe this change assists users in identifying key changes and trends impacting the calculated contribution rates. 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 LEOFF Plan 2. Such information can be found in the *Report on Financial Condition* (RFC), which we issue every two years. The key measures we use in the RFC to assess the health of the pension plan include funding level, adequacy and affordability of contributions, and risk.

Commentary on Risk

Actuarial Standards of Practice (ASOP) guide actuaries when performing and communicating their work. ASOP 51 is specific to communicating risk in defined benefit pension plans, particularly in how actual future measurements may differ significantly from expected future measurements. In the course of developing our actuarial valuation, we make hundreds of assumptions, such as the level of returns on future investments, the rate of mortality for retirees, and the number of members contributing to the pension system annually. In some cases, small changes in these assumptions or unexpected plan experience can lead to significant changes in measurements, like the calculation of a plan's contribution rates or the projection of a plan's funded status. This can affect plan risk, and these sensitivities can evolve as the plans grow and mature over time. The Legislature's response to these changes and their action governing the state's pension system also affects plan risk.

To help readers better understand some of these risks and their potential impacts, we have developed a Commentary on Risk webpage. In the **Actuarial Exhibits** section of this report, we have also included the impact to LEOFF Plan 2's funded status from changes in discount rates and mortality improvement, two of our most impactful assumptions.

Contribution Rates

We determine the member, employer, and state contribution rates as a percentage of salary based on the funding policy for the plan. The following summary table shows contribution rates based on the 2021 valuation, along with rates from the 2019 valuation. Throughout this report, we reconcile how plan experience compared to our assumptions over the past two years. In doing so, we compare the contribution rates calculated under this valuation against those rates calculated under the previous rate-setting valuation. The **Actuarial Exhibits** section of this report shows how we developed the contribution rates for 2021.

Calculated Contribution Rates		
	2021	2019
Member	9.94%	7.68%
Employer*	5.96%	4.61%
State	3.98%	3.07%

**Excludes administrative expense rate.*

Substitute House Bill (SHB) 1701, passed during the 2022 Legislative Session, capped LEOFF 2 contribution rates at the levels adopted by the LEOFF Plan 2 Retirement Board for the 2023-25 Biennium; the calculated contribution rates in the previous table do not reflect this cap.

Projected Contribution Rates

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 and will be updated in the fall of 2022 to reflect the results from this report. Please note that these projected rates are subject to change based on modifications to plan provisions, assumptions, and the actual experience of the plan.

Contribution Rate-Setting Cycle

Under current Washington State law, in July of even-numbered years, the Board reviews the basic contribution rates calculated by the Board-retained actuary. These rates are based on an actuarial valuation performed on asset, participant, and plan information compiled in odd-numbered years. In calculating basic contribution rates, the Board-retained actuary applies the statutory funding policies described in this section. The Board then adopts contribution rates for LEOFF 2 as provided under RCW 41.26.720(1)(a). The adopted rates remain in place for the ensuing biennium, subject to revision by the Legislature.

Contribution Rates			
	2021-23 Adopted	2023-25 Calculated	2023-25 Adopted*
Member	8.53%	9.94%	8.53%
Employer**	5.12%	5.96%	5.12%
State	3.41%	3.98%	3.41%

**Adopted for the period 2023-27.*
***Excludes administrative expense rate.*

The calculated rates for the 2023-25 Biennium are based on the funding policy set under SHB 1701 and described in the next section. The Board adopted rates for the 2023-25 Biennium consistent with contribution rate cap included in SHB 1701.

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, if enacted, are included in the basic rates at the beginning of the next contribution rate-setting cycle.

Funding Policy

Washington State relies on systematic actuarial funding to finance the ongoing 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 investment of these contributions is under the direction of the Washington State Investment Board (WSIB). RCW 43.33A.110 requires WSIB to maximize investment returns at a prudent level of risk.

The state's funding policy is found in RCW 41.45 — 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 amortize the total cost of LEOFF 1 no later than June 30, 2024.
- Continue to fully fund LEOFF 2 as provided by law.
- Establish long-term employer contribution rates that will remain a relatively predictable proportion of future state budgets.
- Fund, to the extent feasible, all benefits 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.

The LEOFF 2 funding policy splits the required contribution rate by 50 percent for members, 30 percent for employers, and 20 percent for the state. If all actuarial assumptions are realized and all future contributions required under this funding policy are made, we expect the plan to accumulate sufficient assets to provide for all future benefits for current members when due.

SHB 1701 revised the LEOFF 2 minimum contribution rate funding policy to include three tiers of rates based the plan's funded ratio. The minimum rates equal 100 percent of the Entry Age Normal Cost (EANC) when the funded ratio is below 105 percent. The minimum rates decrease to 90 percent of the EANC when the funded ratio meets or exceeds 105 percent and is less than 110 percent. If the funded ratio is at least 110 percent, then the minimum rates equal 80 percent of the EANC. An additional reduction in 90 and 100 percent minimum EANC rates applies for 15 years starting in the 2025-27 Biennium. Please see the bill language and OSA's fiscal note for more details.

Comments on 2021 Results

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

Changes in Plan Provisions

SHB 1701, passed during the 2022 Legislative Session, expanded benefits for LEOFF 2 members, capped 2023-25 Biennium contribution rates, and altered the minimum contribution rate funding policy. Otherwise, we observed no changes in plan provisions.

Changes in Assumptions and Methods

This valuation reflects updates to the economic assumptions for all plans consistent with our *2021 Economic Experience Study*. Recommendations for lowering the assumptions for future investment earnings and general salary growth were adopted by the LEOFF Plan 2 Retirement Board. See the **Actuarial Gain/Loss** section for the contribution rate impact from the new assumptions.

Changes in Covered Population and Plan Experience

The actual rate of investment return on the Market Value of Assets (MVA) was 4.52 and 31.62 percent for Fiscal Years 2020 and 2021, respectively. The 2020 asset loss is recognized in the Actuarial Value of Assets (AVA) over a three-year period. The asset gain from 2021 is recognized in the AVA over an eight-year period. These deferral periods are consistent with the AVA method set in statute.

For plan experience, salaries grew more than expected for active members. LEOFF 2 also experienced lower numbers of new hires than in prior valuations, consistent with other open plans. We observed no other significant and unexpected changes in the population. For example, mortality experience across all retirement systems did not appear to be significantly higher during the 2019-21 Biennium as a result of COVID.

We also track plan maturity, viewed through population metrics compared to financial resources, and demographic changes from 2019 to 2021. For example, we observed a small increase in the number of active members, while the annuitant population grew by approximately 25 percent. These results were in line with expectations given the current demographics of LEOFF 2. We include background and projections of plan maturity measures on our Commentary on Risk webpage.

Detailed gain and loss information 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 following table summarizes key measures of actuarial liability along with the liabilities from the last rate-setting valuation. The Future Value of Fully Projected Benefits represents the total expected value of all future benefit payments for all members of LEOFF 2 as of the valuation date.

Actuarial Liabilities		
(Dollars in Millions)	**2021**	**2019**
Future Value of Fully Projected Benefits	$138,549	$118,647
Present Value of Fully Projected Benefits	$21,075	$16,096
Present Value of Accrued Benefits	$15,819	$11,992
Valuation Interest Rate	7.00%	7.40%

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 currently assumed valuation interest rate each year, we anticipate 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 or "earned" as of the valuation date based on the Entry Age Normal (EAN) actuarial cost method.

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

Assets

The following table shows the MVA and AVA along with approximate rates of investment return. 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 number of years over which we smooth is dependent on the magnitude of the gain or loss. 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 additional information on the plan's assets and for the development of the AVA.

Assets		
(Dollars in Millions)	**2021**	**2019**
Market Value of Assets (MVA)[1]	$19,637	$13,916
Actuarial Value of Assets (AVA)[1]	16,494	13,294
Member/Employer Contributions	785	377
Disbursements	791	316
Investment Return	5,233	1,154
Other Revenue	$44	$16
MVA Return[2]	31.65%	8.89%
AVA Return[3]	10.41%	10.36%

[1] 2021 and 2019 assets adjusted to reflect Benefit Improvement Account transfers under 2022 legislation (C 125 L 22) and 2020 legislation (C 366 L 19), respectively.

[2] Dollar-weighted rate of return on the MVA, net of expenses. MVA return in 2020 was 4.50%.

[3] The AVA is used in determining contribution rates. AVA return in 2020 was 9.02%.

The 2021 asset information displayed above and throughout this report include the $450 million held in the LEOFF 2 Benefit Improvement Account (BIA) on June 30, 2021. Under SHB 1701, those assets are transferred into the LEOFF 2 trust. The 2019 assets do not include the BIA assets.

Funded Status

Funded status is one of many measures that helps explain 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 ratio has one dollar in actuarial assets for each dollar of accrued liability at the valuation date. A plan with a funded ratio 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 displays the funded status for LEOFF 2.

Funded Status		
(Dollars in Millions)	**2021**	**2019**
a. Entry Age Normal Accrued Liability	$15,819	$11,992
b. Market Value of Assets*	19,637	13,916
c. Deferred Gains/(Losses)	3,142	623
d. Actuarial Value of Assets (b - c)*	16,494	13,294
Unfunded Liability (a - d)	($676)	($1,302)
Funded Ratio (d / a)	**104%**	**111%**

Note: Totals may not agree due to rounding.

**2021 and 2019 assets adjusted to reflect Benefit Improvement Account transfers under 2022 legislation (C 125 L 22) and 2020 legislation (C 366 L 19), respectively.*

Participant Data

The following table summarizes the participant data used in the actuarial valuation for the plan year ending June 30, 2021, along with information from the 2019 valuation. See the **Participant Data** section of this report for additional information.

Participant Data	2021	2019
Active Members		
Number	18,683	18,557
Total Salaries *(in Millions)*	$2,289	$2,117
Average Annual Salary	$122,513	$114,085
Average Age	42.3	42.8
Average Service	13.1	13.6
Retirees and Beneficiaries		
Number	7,574	6,064
Average Annual Benefit	$56,202	$51,119
Terminated Members		
Number Vested	1,115	969
Number Non-Vested*	2,626	2,193

**Members who terminated without a vested lifetime benefit but are eligible for a refund of their employee contributions with interest that currently reside in the trust.*

Key Assumptions

The following table displays key economic assumptions used in the actuarial valuation. A reduction to the Valuation Interest Rate and General Salary Growth was adopted by the LEOFF Plan 2 Retirement Board in 2021. This change is consistent with our *2021 Economic Experience Study* (EES).

Key Assumptions	
Valuation Interest Rate	7.00%
Salary Increase	3.25%
Inflation	2.75%

SECTION II.

ACTUARIAL EXHIBITS

Office of the State Actuary

"Supporting financial security for generations."

Actuarial Certification Letter
Law Enforcement Officers' and Fire Fighters' Retirement System Plan 2
Actuarial Valuation Report as of June 30, 2021

November 2022

This report documents the results of an actuarial valuation of the Law Enforcement Officers' and Fire Fighters' Retirement System Plan 2 (LEOFF 2) as defined under Chapter 41.26 of the Revised Code of Washington (RCW). The primary purpose of this valuation is to determine contribution requirements for the retirement plan for the 2023-25 Biennium based on a June 30, 2021, measurement date, consistent with the prescribed funding policy established by the LEOFF 2 Retirement Board (the Board) and Legislature. This valuation also provides information on the funding progress and developments in the plan over the past two years. 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 if changes occur in the methods, assumptions, plan provisions, or applicable law. The Risk Assessment page of our website provides further information on the range and likelihood of potential outcomes that vary from expected results. The Commentary on Risk page of our website provides additional risk education.

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. However, the use of another set of assumptions and methods could also be reasonable and could produce materially different results. Actual results may vary from our expectations.

The economic and demographic assumptions used in this valuation were adopted by the Board. Please see our *2021 Economic Experience Study* (EES) for further information on the economic assumptions. We developed the demographic assumptions used in this valuation during the *2013-18 Demographic Experience Study*. The Legislature prescribed the actuarial cost and asset valuation method and the minimum contribution rate funding policy. 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

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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, however we did adjust the assets to reflect an expected future transfer from the LEOFF 2 Benefit Improvement Account (BIA) consistent with Substitute House Bill 1701 (C 125 L 22). 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 (C 11 L 03 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 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

Michael T. Harbour, ASA, MAAA
Actuary

Contribution Rates

Member and Employer Rate Summary		
	2021	2019
Member	9.94%	7.68%
Employer*	5.96%	4.61%
State	3.98%	3.07%

Excludes administrative expense rate.

Development of Employer/State Rates	
a. Total Normal Cost	19.88%
b. Member Normal Cost (a x 50%)	9.94%
c. Total Employer / State Normal Cost (a - b)	**9.94%**
d. State Normal Cost (a x 20%)	3.98%
e. Employer Normal Cost (c - d)*	5.96%

**Excludes administrative expense rate. The state pays 20% of the total normal cost for LEOFF 2. This reduces the employer contribution rate from 9.94% to 5.96%.*

The following table shows the development of the normal cost rates. Consistent with the funding policy set in statute, the normal cost rates include minimum contribution rates to provide stable and adequate contribution rates over time. Based on the plan's current funded status, the minimum rates are 100 percent of the normal cost calculated under the EAN actuarial cost method. Please see the **Glossary** for a more detailed explanation of EAN.

Development of Normal Cost Rates	
(Dollars in Millions)	
1. Calculated Member Normal Cost Rate	
a. Future Value of Fully Projected Benefits	$138,549
b. Present Value of Fully Projected Benefits	21,075
c. Valuation Assets	16,494
d. Unfunded Fully Projected Benefits (b - c)	4,580
e. Plan 1 Present Value of Future Salaries (PVS)	N/A
f. Plan 2 PVS	26,475
g. Weighted PVS (2e + 2f)	$52,950
h. Member Normal Cost (d / g)	8.65%
i. Member Minimum Contribution Rate	9.94%
j. Member Contribution Rate with Minimum	9.94%
k. Change In Plan Provisions (Laws of 2022)	0.00%
l. Calculated Member Contribution Rate (j + k)	9.94%
2. Calculation of Employer/State Normal Cost Rate	
a. Present Value of Fully Projected Benefits	$21,075
b. Valuation Assets	16,494
c. Unfunded Fully Projected Benefits (a - b)	4,580
d. Present Value of Member Contributions	2,290
e. Employer/State Responsibility (c - d)	$2,290
f. Plan 2 PVS	$26,475
g. Employer/State Normal Cost (e / f)	8.65%
h. Employer/State Minimum Contribution Rate	9.94%
i. Employer/State Contribution Rate with Minimum	9.94%
j. Change In Plan Provisions (Laws of 2022)	0.00%
k. Calculated Total Employer/State Contribution Rate (i + j)	9.94%
3. Adopted Contribution Rates for 2023-25	
a. Member Contribution Rate*	8.53%
b. Employer Contribution Rate (a - c)*	5.12%
c. State Contribution Rate*	3.41%
d. Total Contribution Rate (a + b + c)	**17.06%**

Note: Totals may not agree due to rounding.
**LEOFF 2 rate: 50% Employee, 30% Employer, 20% State.*

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.

Actuarial Liabilities

Actuarial Liabilities		
(Dollars in Millions)	Present Value of Fully Projected Benefits	Entry Age Normal Accrued Liability
Active Members		
Retirement	$12,389	$7,940
Termination	215	36
Death	133	18
Disability	650	336
Return of Contributions on Termination	129	(32)
Return of Contributions on Death	86	47
Total Active	**$13,601**	**$8,346**
Inactive Members		
Terminated Vested	$390	$390
Terminated Non-Vested[1]	22	22
Service Retired[2]	6,506	6,506
Disability Retired	357	357
Survivors	198	198
Total Inactive	**$7,473**	**$7,473**
Laws of 2022[3]	**0**	**0**
2021 Total	**$21,075**	**$15,819**
2019 Total	**$16,096**	**$11,992**

Note: Totals may not agree due to rounding.

[1] Members who terminated without a vested lifetime benefit but are eligible for a refund of their employee contributions with interest that currently reside in the trust.

[2] Includes liability from individuals who are entitled to a portion of the primary member's benefit (legal order payees).

[3] LEOFF 2 liability increases from SHB 1701 included in the Active Members and Service Retired line items. We estimate a total liability increase of approximately $1,250 million in PVFB and $920 million in EAN AL measured at June 30, 2021.

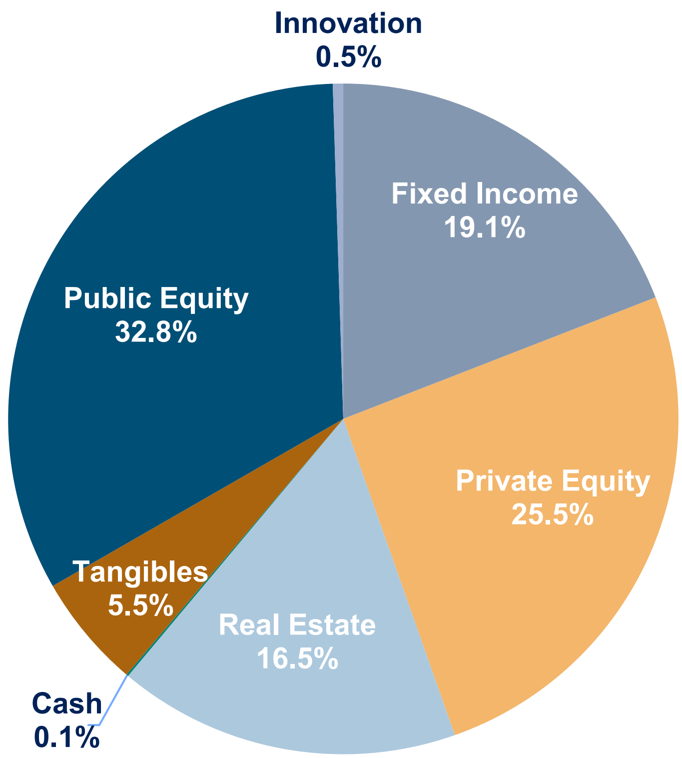
The "Return of Contributions (ROC) on Termination" in the Entry Age Normal Accrued Liability section of the table is negative. This is a result of how these benefits are accrued, over a member's working career, under the EAN actuarial cost method. The accrued liability for a given benefit provision is the difference between (1) today's value of all future benefits for that benefit definition and (2) how much of those future benefits are assumed to be accrued over the rest of the member's career. Item (1) is essentially split into annual "pieces" that are spread evenly across a career from first hire date to last assumed exit. Item (2) is how many more "pieces" they have left to accrue. For benefits like ROC on Termination, while we assume members that are eligible for retirement will no longer elect a ROC benefit when they exit the system, they are still accruing the level piece of item (2) each year until they retire. So in this example of retirement-eligible active employees, item (1) is zero but item (2) is positive. This means we get a negative number when subtracting item (2) from item (1).

Please note GASB mandates this methodology for the accrued liability calculation in financial reporting. We use the same methods in this report – a funding valuation – for easier comparison with financial reporting results. An alternative method is to calculate the accrued liability through the date last eligible for the benefit instead of the end of career. This would eliminate the negative accrued liability components seen above.

We report the present and future value of benefit payments by year on our website. We also show how the present value of these benefit payments varies by interest rate assumptions. For more information or to view projected benefit payments, please visit our Interactive Reports webpage.

Plan Assets

Retirement Commingled Trust Fund (CTF) Asset Allocation



Source: Washington State Investment Board June 30, 2021, Quarterly Report.

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.

Each asset class is unique in terms of expected return, standard deviation, and correlation to other asset classes. Please see page 43 of the 2021 EES for more information.

Change in Market Value of Assets	
(Dollars in Millions)	
2019 Market Value	**$13,916**
Revenue	
Contributions	
Member	391
Employer/State	394
Total Contributions	**785**
Investment Return	5,233
Restorations*	44
Transfers In	0
Miscellaneous	0
Total Revenue	**$6,062**
Disbursements	
Monthly Benefits	769
Refunds	18
Total Benefits	**787**
Transfers Out	0
Expenses	4
Payables	0
Total Disbursements	**$791**
2021 Market Value	$19,187
Adjustments to Market Value**	$450
2021 Adjusted Market Value (MV)	$19,637
2021 Actuarial Value (AV)	$16,494
Ratio (AV / MV)	**84%**

Note: Totals may not agree due to rounding.

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

***Adjusted the Market Value of Assets to reflect the transfer of the Benefit Improvement Account, measured at June 30, 2021, into the LEOFF 2 trust under SHB 1701 (C 125 L 22).*

Calculation of Actuarial Value of Assets			
(Dollars in Millions)			
a. Market Value at 6/30/2021			**$19,637**
Deferred Gains and (Losses)			
Plan Year Ending	**Smoothing Period**	**Years Remaining**	
6/30/2021	8	7	3,083
6/30/2020	3	1	(135)
6/30/2019	2	0	0
6/30/2018	3	0	0
6/30/2017	7	2	194
b. Total Deferral			**$3,142**
c. Market Value less Deferral (a - b)			$16,494
d. 70% of Market Value of Assets			$13,746
e. 130% of Market Value of Assets			$25,528
f. Actuarial Value of Assets*			**$16,494**

Note: Totals may not agree due to rounding.
**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 Fiscal Year 2021	
(Dollars in Millions)	
a. 2020 Market Value*	$14,528
b. Total Cash Flow	(7)
c. 2021 Market Value*	19,121
d. Actual Return (c - b - a)	4,599
e. Weighted Asset Amount	14,530
f. Expected Return (7.4% x e)	1,075
g. Investment Gain/(Loss) for Prior Year (d - f)	$3,524
h. Dollar-Weighted Rate of Return*	31.65%

Note: Totals may not agree due to rounding.
**Source: Washington State Investment Board.*

Investment Gains and (Losses) for Fiscal Year 2020	
(Dollars in Millions)	
a. 2019 Market Value*	$14,159
b. Total Cash Flow	(258)
c. 2020 Market Value*	14,528
d. Actual Return (c - b - a)	$627
e. Weighted Asset Amount	13,937
f. Expected Return (7.4% x e)	1,031
g. Investment Gain/(Loss) for Prior Year (d - f)	($404)
h. Dollar-Weighted Rate of Return*	4.50%

Note: Totals may not agree due to rounding.
**Source: Washington State Investment Board.*

Funded Status

In our actuarial valuation report, we calculate a plan's funded status by comparing the plan's current assets, determined under an asset valuation method, to the actuarial accrued liability of its members calculated under an actuarial cost method. Funded status can vary significantly 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 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 *DRS Annual Comprehensive Financial Report*. These differences occur because the assumptions and methods applied to determine 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 adopted by the Board and is intended to be consistent with the long-term expected return under the plan's funding policy. (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 that we use to determine 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 Board'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 AVA. This asset valuation method smooths the inherent volatility in the 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 2020 and 2021 investment gains or losses, we used an investment return assumption of 7.40 percent. Future calculations will use the new investment return assumption of 7.0 percent. 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 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 of our website for funded status measures that vary by interest rate assumptions and asset valuation methods.

We include information for LEOFF 1 because the prior funding policy required the state to amortize any LEOFF 1 Unfunded Actuarial Accrued Liability (UAAL) no later than June 30, 2024, using projected salaries of both LEOFF 1 and LEOFF 2 members. Given LEOFF 1 is currently fully funded, no UAAL exists. If a positive UAAL in LEOFF 1 re-emerges, future funding policy may vary from the past funding policy.

Funded Status on an Actuarial Value Basis*

(Dollars in Millions)	LEOFF 1	LEOFF 2
EAN Accrued Liability	$4,209	$15,819
Valuation Assets	$6,143	$16,494
Unfunded Liability	($1,934)	($676)
Funded Ratio		
2021	**146%**	**104%**
2020	148%	113%
2019	141%	111%
2018	135%	108%
2017	131%	109%
2016	126%	105%
2015	125%	105%
2014	127%	107%

**Liabilities valued using the EAN cost method at an interest rate of 7.0%. All assets have been valued under the actuarial asset method.*

Generally speaking, 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 the valuation date, and under the data, assumptions and methods used for this actuarial valuation, only LEOFF 1 has sufficient assets to cease ongoing contributions.

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

The funded status depends on numerous assumptions. Two of the most significant assumptions are the mortality rates, which estimate how long we expect members to live, and the interest rate or expected return on plan assets. A key component of the mortality assumption is the rate at which mortality is expected to improve in the future. To show this, we doubled the current mortality improvement assumption (longer lifespans than our best estimate) and assumed no future improvements (shorter lifespans than our best estimate).

Sensitivity of Funded Ratios to Mortality Rates			
(Dollars in Millions)	**No Mortality Improvement**	**Best Estimate Mortality**	**Double Mortality Improvement**
Accrued Liability	$14,896	$15,819	$16,764
Valuation Assets	$16,494	$16,494	$16,494
Unfunded Liability	$1,599	$676	($269)
Funded Ratio	111%	104%	98%

Sensitivity of Funded Ratios to Interest Rates			
(Dollars in Millions)	**1% Lower 6.0%**	**Best Estimate 7.0%**	**1% Higher 8.0%**
Accrued Liability	$18,246	$15,819	$13,832
Valuation Assets	$16,494	$16,494	$16,494
Unfunded Liability	($1,752)	$676	$2,662
Funded Ratio	90%	104%	119%

Actuarial Gain/Loss

The following table displays 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 Member Contribution Rate by Source	
Change in Rate	**LEOFF 2***
2019 Rate Before Laws of 2020	**7.68%**
Remove Rate Floor	(1.87%)
2019 Adjusted Rate	**5.81%**
Liabilities	
Salaries	0.34%
Termination	(0.06%)
Retirement	0.14%
Disability	0.00%
Mortality	0.01%
Return to Work	1.64%
Other Liabilities	0.19%
Total Liability Gains/Losses	**2.26%**
Assets**	
Contributions	(0.29%)
Disbursements	0.16%
Investment Returns	(1.71%)
Asset Gains/Losses	**(1.84%)**
Incremental Changes	
Plan Change	1.62%
Method Change	0.00%
Assumption Change	0.00%
Correction Change	0.00%
Experience Study Change	1.94%
Total Incremental Changes Gains/Losses	**3.56%**
Present Value of Future Salaries Gains/Losses	**(1.13%)**
Other Gains/Losses	**(0.01%)**
Total Change	**2.84%**
2021 Preliminary Rate	**8.65%**
Increase from Applied Rate Floor	1.29%
Laws of 2022	0.00%
2021 Adjusted Rate	**9.94%**

**State and employer contribution rates equal 40 and 60 percent of the member contribution rate, respectively.*

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

SECTION III.

PARTICIPANT DATA

Overview of System Membership

LEOFF 2 membership includes firefighters; emergency medical technicians; law enforcement officers including sheriffs; university, port, and city police officers; and enforcement officers with the Department of Fish and Wildlife.

The following table shows 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.

Active Membership By Employer	
State Agencies	142
Higher Education	99
Counties	2,980
County Sub Divisions	439
First Class Cities	5,176
Other Cities	5,102
Ports	212
Fire Districts	4,533
Total	**18,683**

Reconciliation of Active and Annuitant Data	
2019 Actives	**18557**
Transfers	0
Hires/Rehires	2,489
New Retirees	(1,377)
Deaths	(29)
Terminations	(957)
2021 Actives	**18,683**
2020 Annuitants	**6064**
New Retirees*	1,582
Annuitant Deaths	(107)
New Survivors	64
Other	(29)
2021 Annuitants	**7,574**
Ratio of Actives to Annuitants	**2.47**

**Includes service and disability retirees.*

Summary of Plan Participants

Summary of Plan Participants	2021	2019
Active Members		
Number	18,683	18,557
Total Salaries *(Millions)*	$2,289	$2,117
Average Age	42.3	42.8
Average Service	13.1	13.6
Average Salary	$122,513	$114,085
Terminated Members		
Vested	1,115	969
Non-Vested*	2,626	2,193
Total Terminated	**3,741**	**3,162**
Annuitants		
Service Retired**	6,698	5,312
Disability Retired	543	473
Survivors	333	279
Total Annuitants	**7,574**	**6,064**
Average Monthly Benefit, All Annuitants	$4,684	$4,260
Number of New Service Retirees	821	614
Average Monthly Benefit, New Service Retirees	$5,597	$4,942

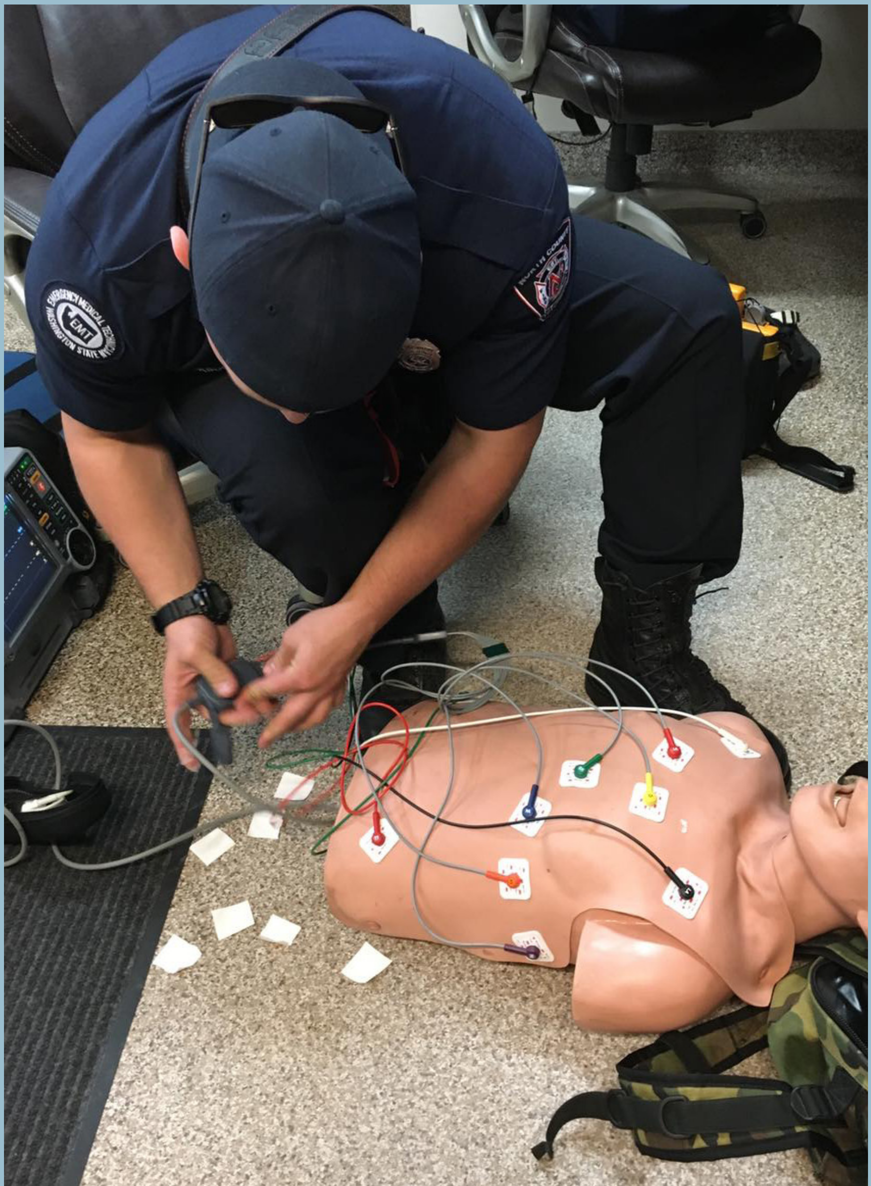
**Members who terminated without a vested lifetime benefit but are eligible for a refund of their employee contributions with interest that currently reside in the trust.*

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

Retirement Age and Service	2021	2019
All Retired Law Enforcement Officers		
Average Entry Age	32.0	32.4
Average Age at Retirement	56.0	55.9
Average Service at Retirement	24.0	23.5
All Retired Fire Fighters		
Average Entry Age	31.2	31.5
Average Age at Retirement	57.2	57.0
Average Service at Retirement	26.0	25.5
All Members who Retired in the Last Year (With 21-25 Years of Service)		
Average Monthly Final Average Salary	**$10,037**	**$8,967**

SECTION 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, a funding policy, economic assumptions, and demographic assumptions. The actuary may also use an asset valuation method other than the market value. The sections below list the methods and assumptions that change regularly or are new since the last actuarial valuation report. Please see the Actuarial Methods webpage for descriptions of the actuarial cost methods and asset valuation method we use for this valuation, and please see the Actuarial Assumptions webpage for descriptions of all remaining assumptions.

Changes in Methods and Assumptions since the Last Valuation

- We updated the Joint-and-Survivor Factors and Early Retirement Factors in our model. These factors are used to value benefits for early retirement and survivors of members that die prior to retirement. These factors match the administrative factors recently provided to DRS for future implementation that reflect current demographic and economic assumptions.
- We updated the economic assumptions based on the 2021 action of the LEOFF Plan 2 Retirement Board. The investment return assumption was reduced from 7.40 to 7.00 percent, and the salary growth assumption was lowered from 3.50 to 3.25 percent. The action is a result of recommendations from our biennial EES; please see the full report for additional details.
- We adjusted the LEOFF 2 liabilities, plan assets, and funding policy based on the passage of SHB 1701 (C 125 L 22). This bill provided an increase to pension benefits, moved assets from the LEOFF 2 BIA to the trust fund available to fund current law benefits, and adjusted the minimum contribution rate policy. Please see our fiscal note for the details on these new plan provisions and our website for changes in our assumptions.
- We considered but did not make changes to our model to reflect Senate Bill 5021 (C 12 L 21). This bill passed in the 2021 Legislative Session to provide pension benefit protection for members experiencing reductions in pay or service due to the COVID-19 budgetary crisis. Available data suggests furloughs tended to be significantly less than initially anticipated by the state and our fiscal note. As such, we did not make an adjustment within our model to reflect this legislation.

Comments on Valuation Model

As required under ASOP No. 56 – Modeling, we share the following comments related to our reliance on the ProVal® software developed by Winklevoss Technologies.

- We understand this software model was primarily created for use by actuaries when performing valuations and projections of pension and retiree medical plans. The use of the model for this analysis is appropriate given it's intended purpose.
- To assess the general operation of the model, we reviewed the output for reasonableness. This includes comparing the results to our simplified estimates done in Microsoft Excel and examining sample lives to confirm the programming is working as intended. We are not aware of any known weaknesses or limitations of the model that have a material impact on the results.

- The Board hires auditors to independently review and replicate the results of rate-setting valuations. This process provides an additional reasonableness check of the model output.

Additionally, we considered how the use of different inputs to the model (e.g., data, assumptions, provisions) produce different results and evaluated the relative impacts to our expectations. This allows us to gain a deeper knowledge of the model's important dependencies and major sensitivities.

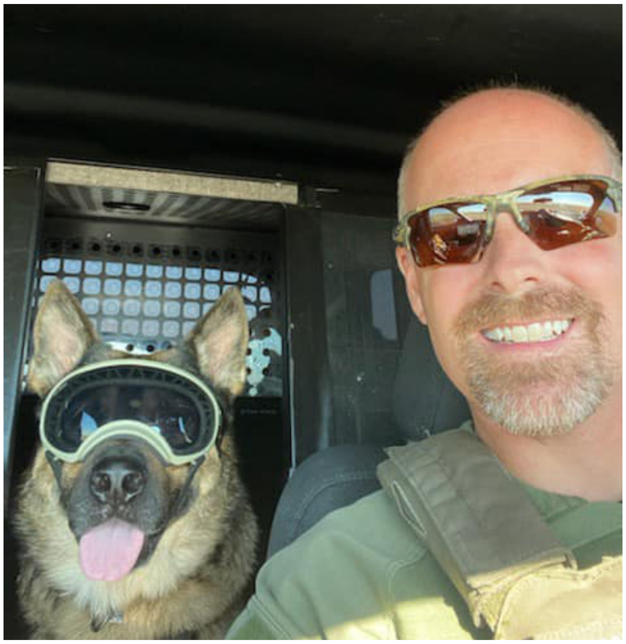
Summary of Plan Provisions

The summary of key plan provisions used in the actuarial valuation are provided in two sets of tables. The table below contains plan provisions that can change frequently, while the provisions that change less frequently can be found on the Summary of Plan Provisions page of our website.

The table below and those on our website 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 retirement 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.

Summary of Frequently Changing Plan Provisions	
	Plan 2
COLA	Lesser of CPI* or 3%
Material Plan Provision Changes Since Last Valuation	Benefit Improvement/ New Minimum Funding Policy (C 125 L 22)
Significant Plan Provisions Not Included in This Valuation	None

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



SECTION V.

RESOURCES

The Office of the State Actuary's Website

Our website 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 the Office of the State Actuary (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 member/annuitant age.

Historical Data
Table summarizing valuation statistics by valuation period.

2021 Report on Financial Condition and Economic Experience Study
Report examining the financial health of the retirement systems and long-term economic assumptions.

2013-2018 Demographic Experience Study
Most recent report examining demographic behavior.

Risk Assessment
Information examining the effect of unexpected experience on the retirement plan.

Commentary on Risk
Educational information on the risks inherent in our actuarial measurements and how these measurements could vary under different circumstances.

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.

ACTUARIAL VALUATION REPORT

Law Enforcement Officers' and Firefighters' Plan 2 Retirement Board

Office of the State Actuary
"Supporting financial security for generations."