WASHINGTON STATE VOLUNTEER FIRE FIGHTERS' AND RESERVE OFFICERS' RELIEF AND PENSION FUND

2018 ACTUARIAL VALUATION

OCTOBER 2019

BOARD FOR VOLUNTEER FIRE FIGHTERS AND RESERVE OFFICERS

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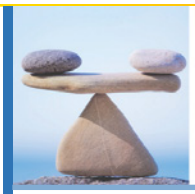

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Volunteer Fire Fighters' and Reserve Officers' Relief and Pension Fund Actuarial Valuation Report As of June 30, 2018

October 2019

As required under Revised Code of Washington (RCW) Chapter 41.24.320, this report documents the results of the actuarial valuation which the Office of the State Actuary (OSA) performed on the Volunteer Fire Fighters' and Reserve Officers' (VFF) Relief and Pension Fund of Washington.

Our primary purpose for performing this valuation is to determine the pension and relief contribution requirements for the plan as of June 30, 2018, under the funding policy established by the Board for Volunteer Fire Fighters and Reserve Officers (the Board). This valuation also provides information on the funding progress and developments in the plan over the past year. We organized this report into the following four sections:

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

The **Summary of Key Results** provides a high-level summary of the valuation results. The next two sections of the report provide detailed actuarial asset and liability information and membership data. The **Appendices** summarize the actuarial assumptions and methods, major plan provisions, and supporting information used to perform this valuation.

We encourage you to submit any questions concerning this report to our mailing address or our e-mail address at state.actuary@leg.wa.gov. We also invite you to visit our website (leg.wa.gov/osa) for further reference information.

Sincerely,

Michael T. Harbour, ASA, MAAA
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Section One: Summary of Key Results

INTENDED USE

The purpose for performing the VFF Relief and Pension Fund Actuarial Valuation is to:

- Develop contribution rates to pre-fund the pension and relief benefits under the funding policy established by the Board.
- Measure the pension system's funding progress.
- Compare actual experience with assumptions used.
- Detect significant demographic changes.
- Highlight key plan, assumption, and method changes since the last valuation.

We do not intend this report to satisfy the accounting requirements under the Governmental Accounting Standards Board rules.

FUNDING POLICY

The Board relies on systematic actuarial funding to finance the on-going cost of the pension and relief plans. Under this financing approach, we reduce the cost of future pension and relief payments by the expected long-term return on invested contributions. The plan's assets are first allocated to pre-fund the pension benefits. Any assets above the pension plan's accrued liability are allocated to the relief plan. This is a cost-sharing plan that relies on contributions from employees and employers, while the state contributes 40 percent of the annual Fire Insurance Premium Tax collected. Please refer to the **Appendices** for additional details on the actuarial funding methods. 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.

CONTRIBUTION RATES

We determine the pension and relief contribution rates by performing an actuarial valuation. Consistent with current Board funding policy, we determine the per-person level dollar contribution rate required to pre-fund pension benefits using the Entry Age Normal (EAN) Funding Method. This rate includes the Normal Cost (NC) rate, plus a rate to amortize the Unfunded Actuarial Accrued Liability (UAAL). We determine the per-person level dollar contribution rate required to pre-fund relief benefits using the Aggregate Funding Method.

As of the date of this valuation, June 30, 2018, the plan's current level of assets exceeds its combined pension and relief Present Value of Future Benefits (PVFB). This results in the calculation of a negative relief rate.

For reference, the table at right displays the annual contributions, per person, collected by the Board for calendar year 2019. The VFF member rates are set in statute under RCW 41.24.030 but the Board reviews contributions for Reserve Law Enforcement Officers (RLEO) and Emergency Medical Technicians (EMT) every fall. Employers of RLEOs and EMTs pay the full cost of their benefits. Under current funding policy, the state also collects taxes on fire insurance premiums to help fund plan costs.

Required Annual Contributions Per Person		
Valuation Year	**2017**	**2018**
Pension Rate		
Normal Cost Rate	$100	$100
UAAL Rate	0	0
Total Pension Rate	**$100**	**$100**
Relief Rate		
Normal Cost Rate	($70)	($412)

2019 Collected Annual Contributions Per Person	
VFF	
Pension Rate	
Member Fee	$30
Employer Fee	30
Relief Rate	
Employer Fee	$30
RLEOs and EMTs	
Pension Rate	
Member Fee	$30
Employer Fee	105
Relief Rate	
Employer Fee	$235

ACTUARIAL LIABILITIES

The following table summarizes key measures of actuarial liability along with the liabilities from last year's valuation. The PVFB represents the total expected value of all future benefit payments for all members, discounted back to the valuation date using the valuation interest rate. The EAN Accrued Liability identifies the portion of the PVFB that has been accrued as of the valuation date based on the EAN actuarial cost method.

Actuarial Liabilities		
(Dollars in Millions)	**2017**	**2018**
Present Value of Future Benefits		
Pension Benefits	$194.0	$194.5
Relief Benefits	$18.4	$18.2
Pension Plan*		
EAN Accrued Liability	$190.2	$190.7
UAAL	$0.0	$0.0
Valuation Interest Rate	7.00%	7.00%

**We do not calculate an actuarial accrued liability for the relief plan since the relief benefits are paid as they are incurred.*

ASSETS

Consistent with the Board's adopted funding policy, assets are first allocated to the pension benefits. Any assets above the pension's Actuarial Accrued Liability (AAL) are then allocated to the relief benefits.

To limit the volatility in 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 Actuarial Value of Assets (AVA) equals the Market Value of Assets (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 the development of the AVA.

Assets		
(Dollars in Millions)	**2017**	**2018**
Assets *(Measured at End of Year)*		
MVA	$229.8	$245.3
MVA Return*	13.2%	8.9%
AVA	$212.4	$230.3
AVA Return	8.6%	10.9%
Revenues and Disbursements		
Contributions	0.9	0.9
Net Fire Insurance Premium Tax	6.6	7.2
Investment Earnings	26.6	20.3
Disbursements	(13.1)	(13.0)

**This is the dollar-weighted rate of return on the MVA.*

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 AAL covered by the AVA. A plan with a 100 percent funded status has one dollar in actuarial assets for each dollar of accrued liability at the valuation date.

Based on the current funding policy, any assets above the pension plan AAL are allocated to fund the relief benefits. As a result, the pension plan would remain 100 percent funded when total assets exceed the pension AAL.

Pension Funded Status		
(Dollars in Millions)	**2017**	**2018**
a. Entry Age Normal Accrued Liability	$190.2	$190.7
b. Actuarial Value of Assets Allocated to Pensions	190.2	190.7
c. Unfunded Liability (a - b)	0.0	0.0
d. Funded Ratio (b / a)	100%	100%

Note: Totals may not agree due to rounding.

We do not calculate an AAL for the relief plan since the relief benefits are paid as they are incurred. Relief benefits are not earned (or accrued) as a member's service increases. As such, a funded status for the relief plan is not calculated.

PARTICIPANT DATA

Changes in the size and composition of plan membership play a major role in the results of the valuation. We observed the following changes in plan membership since last year's valuation.

Changes in Participant Data			
	2017	2018	Percent Change
Actives			
Number of Active Members in Relief Plan	11,184	10,785	(4%)
Number of Active Members in Pension Plan	9,223	8,960	(3%)
Percent of Volunteers Covered by Pension Plan	82%	83%	1%
Average Age	42.1	42.1	(0%)
Average Years of Service	10.8	10.6	(2%)
Inactives			
Number of Retirees/Beneficiaries	4,446	4,494	1%
Number of Terminated Vested Members	6,120	6,181	1%
Number of Survivors (Line of Duty)	9	8	(11%)
Number of Members with Permanent Disabilities	12	11	(8%)

ACTUARIAL GAIN/LOSS

The following table describes the various sources that contribute to the change in contribution rates from one year to the next. For each source, we compare the actual amount experienced by the plan to the amount we assumed. Any difference will increase or decrease the contribution requirements accordingly. The changes in contribution rates shown in the following table represent a summary of how the Pension and Relief contribution rates changed from the prior valuation. The Actuarial Gain/Loss tables in the **Actuarial Exhibits** section of the report provide further detail.

Change in Contribution Rates by Source			
	Pension NC	Pension UAAL	Relief NC
2017 Contribution Rate	**$100**	**$0**	**($70)**
Liability (Gains)/Losses	$13	($21)	$17
Asset (Gains)/Losses	$0	$21	($376)
PV of Future Service (Gains)/Losses	($13)	$0	$37
Other (Gains)/Losses	$0	$0	$0
Total Change	**($0)**	**$0**	**($322)**
2018 Preliminary Rate (Before 2019 Changes)	**$100**	**$0**	**($391)**
Incremental Changes (Gains)/Losses	$0	$0	($21)
Laws of 2019	$0	$0	$0
2018 Contribution Rate	**$100**	**$0**	**($412)**

*Note: Totals may not agree due to rounding. Please see the **Methods** section of the **Appendices** for details on the modified version of the EAN cost method used. Non-standard sources of annual gain/loss are produced as a result.*

KEY CHANGES SINCE THE PRIOR VALUATION

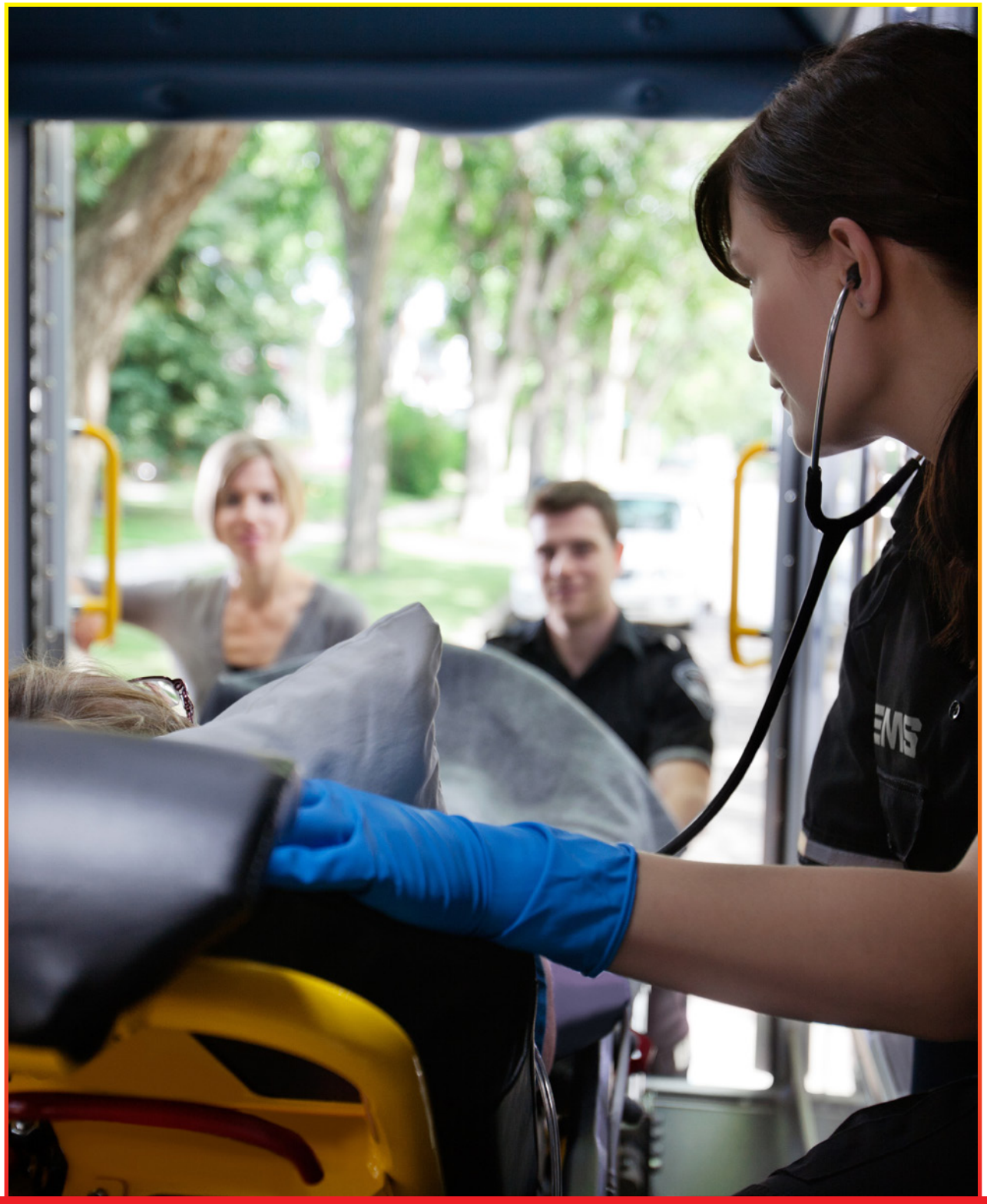
Since the *2017 Volunteer Fire Fighters' and Reserve Officers' Relief and Pension Fund Actuarial Valuation Report* (VAVR), the plan experienced actuarial gains and losses as a result of economic and demographic experience that differed from our long-term assumptions. Actuarial gains will reduce contribution rates; actuarial losses will increase contribution rates. Under a reasonable set of actuarial assumptions and methods, actuarial gains and losses will offset over long-term experience periods.

Economic Experience. The investment rate of return and the Fire Insurance Premium Tax are key factors that impact the assets of the plan. The rate of investment return on the AVA for the plan year was higher than the assumed rate of 7.0 percent. These strong returns combined with the funds received from the Fire Insurance Premium Tax decreased the relief contribution rates calculated for this valuation.

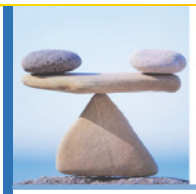
Demographic Experience. Actual termination, retirement, disability, and mortality experience resulted in limited actuarial gains. Overall, these factors led to a smaller increase in liabilities than expected. However, the net decline in total active plan membership played a more significant role in the resulting liabilities.

The combined impact of all economic and demographic experience results in (1) the pension contribution rate changing by less than a dollar, and (2) the relief contribution rate significantly decreasing. This is due to the plan's current level of assets which exceed its total pension and relief liabilities.

Detailed gain and loss information by plan can be found in the **Actuarial Exhibits** section of this report. Please see the **Actuarial Certification Letter** for additional comments on the 2018 valuation results.



Section Two: Actuarial Exhibits



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Actuarial Certification Letter
Volunteer Fire Fighters' and Reserve Officers'
Relief and Pension Fund
Actuarial Valuation Report
As of June 30, 2018

October 2019

We prepared this report for the Board for Volunteer Fire Fighters and Reserve Officers (the Board). This report documents the results of the actuarial valuation we performed on the Volunteer Fire Fighters' and Reserve Officers' Pension and Relief Benefits as defined under Chapter 41.24 of the Revised Code of Washington. The primary purpose for performing this valuation is to determine the contribution requirements for the pension and relief plans as of the valuation date, June 30, 2018, consistent with the Board's adopted funding policy. This valuation also provides information on the funding progress and developments in the plan 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.

To produce the valuation results summarized in this report, we performed calculations requiring assumptions about future economic and demographic events. We applied the relief-related demographic assumptions developed in the *2018 Relief Experience Study*. We also utilized termination and retirement assumptions developed in the *VFFRPF 2008-2013 Pension Experience Study*. Several other demographic assumptions rely on experience from other Washington State retirement systems and are detailed in the *2007-2012 Demographic Experience Study*. We relied on the medical trend rates from the *2018 Other Postemployment Benefits Actuarial Valuation Report*. These trend rates and other healthcare-related assumptions were either set or reviewed by a healthcare actuary, since we do not have healthcare expertise.

We believe that the assumptions and methods used in the 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.

The Board established a fund to provide for both pension and relief benefits. The Board adopted the policy to pre-fund the pension benefits using the Entry Age Normal (EAN) Actuarial Funding Method. The Board adopted the amortization policy for the Unfunded Actuarial Accrued Liability (UAAL), the investment rate of return assumption, and the asset valuation method used in this valuation. The Board also adopted the policy to pre-fund the relief benefits using the Aggregate Actuarial Funding Method. We believe the asset valuation method is reasonable for its intended purpose of addressing contribution rate volatility when applied in combination with these funding methods and the current asset allocation. Unless noted otherwise, we selected all other assumptions and methods used in this valuation.

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Certification Letter
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Under current funding policy, certain plan costs are paid by members, employers, and the state. The contribution rate charged to individual members or employers is not intended to cover the full actuarial costs of the plan. However, annual plan income (including state contributions from fire insurance premium taxes, but excluding investment income), continues to exceed the annual actuarial requirements for the plan. 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. We have not performed analysis of the potential range of such future measurements for the purposes of this valuation.

The Board provided us with member, beneficiary, and relief benefit data. We checked the data for reasonableness as appropriate based on the purpose of the valuation. Washington State Investment Board (WSIB) and the Office of the State Treasurer (OST) provided financial and asset information. An audit of the data and financial information was not performed. 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 Board and OSA are actively working together to further improve the quality of the data. We previously recommended the Board implement a new data collection process for the relief benefits. A more detailed reporting of medical expenditures on an individual member basis and collecting additional beneficiary data is important in preparing for future experience studies. We use experience studies to set the assumptions upon which the projected costs of the plan are based. In addition, continued improvement in the quality of the participant data will increase the reliability of future valuation results.

A new Actuarial Standard of Practice, Number 51 (ASOP 51[1]), goes into effect for valuation dates after November 1, 2018. ASOP 51 risk measures will be included in the June 30, 2019, Actuarial Valuation Report.

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 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,

Michael Harbour

Michael Harbour, ASA, MAAA
Actuary

Lisa A. Won, ASA, FCA, MAAA
Deputy State Actuary

[1] *Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions.*

CONTRIBUTION RATES

We used the EAN Funding Method to determine the pension contribution rates as a level dollar amount. This method divides the contribution rate into two parts: a NC rate and a rate to amortize the UAAL. We used the Aggregate Funding Method to determine the relief contribution rates as a level dollar amount.

The total pension contribution rate, which is the sum of the NC and UAAL pension rates, and the relief contribution rate should be sufficient to fund all projected pension and relief benefits of today's members. However, this assumes:

- Member contributions, employer contributions, and premium taxes are collected regularly.
- Benefit provisions remain the same.
- Assumptions prove reasonable.

Required Annual Contributions	
	Per Person*
Pension Benefits	
Entry Age Normal Cost	$100
Cost of UAAL	$0
Total Pension Rate	**$100**
Relief Benefits	
Aggregate Normal Cost	($412)
Total Pension and Relief Rate	
Per Person	**($312)**

Note: Totals may not agree due to rounding.
**The administrative and expenses are approximately $44 per person for this valuation.*

We do not expect a smooth pattern of future contributions due to the variability of the premium tax on fire insurance policies. The plan receives a portion of the annual premium taxes, which serve as a main source of revenue for the system. See the **Actuarial Methods** section for more detail. Additionally, the method for allocating assets between the pension and relief plans, could amplify the annual volatility of the relief contribution rate.

Development of Pension Plan Normal Cost*	
(Dollars in Thousands)	Total
Future Value of Fully Projected Benefits	$627,161
a. Present Value of Fully Projected Benefits (PVFB)	194,454
b. Entry Age Normal Actuarial Accrued Liability (AAL)	190,705
c. Present Value of Future Normal Costs (PVFNC) (a - b)	3,749
d. Present Value of Future Service (PVFS)**	37,334
e. Per Person Entry Age Normal Cost (c / d, in Dollars)	**$100**
f. Number of Active Members in Pension Plan	8,960
g. Entry Age Normal Cost (e x f)	$900

Please see the **Methods section of the **Appendices** for details on the modified version of the EAN cost method used.*
***We calculated the Pension PVFS over all active pension members.*
Note: Totals may not agree due to rounding.

Development of Pension Plan UAAL	
(Dollars in Thousands)	**Total**
Future Value of Fully Projected Benefits	$627,161
a. Present Value of Fully Projected Benefits (PVFB)	194,454
b. Actuarial Value of Assets (AVA) Allocated to Pensions	190,705
c. Unfunded PVFB (a - b)	3,749
d. Present Value of Future Normal Costs (PVFNC)	3,749
e. Unfunded Actuarial Accrued Liability (UAAL) (c - d)	**$0**
f. Contribution to Amortize the UAAL (Rolling 15-Year)	0
g. Number of Active Members in Pension Plan	8,960
h. Per Person UAAL Contribution (f / g, in Dollars)	**$0**

Note: Totals may not agree due to rounding.

Development of Relief Plan Normal Cost	
(Dollars in Thousands)	**Total**
Future Value of Fully Projected Benefits	$45,190
a. Present Value of Fully Projected Benefits (PVFB)	$18,180
b. Actuarial Value of Assets (AVA)*	$39,571
c. Unfunded PVFB (a - b)	($21,391)
d. Present Value of Future Service (PVFS)**	51,865
e. Per Person Aggregate Normal Cost (c / d, in Dollars)	**($412)**
f. Number of Active Members in Relief Plan	10,785
g. Aggregate Normal Cost (e x f)	($4,448)

**We use the excess assets above those allocated to the pension plan for purposes of calculating an aggregate normal cost rate.*

***We calculated the Relief PVFS over all active relief members.*

Note: Totals may not agree due to rounding.

As of the date of this valuation, June 30, 2018, the plan's current level of assets exceeds its combined pension and relief present value of future benefits. This results in the calculation of a negative relief rate.

ACTUARIAL LIABILITIES

Present Value of Benefits – Pension Plan*		
(Dollars in Thousands)		
Liability Measures	**EAN AAL****	**Fully Projected**
Active Members		
Retirement	$38,337	$40,201
Termination	11,967	13,504
Death Benefits	1,068	1,157
Withdrawal	1,751	2,009
Total Actives	**$53,122**	**$56,871**
Inactive Members		
Retirees	$82,332	$82,332
Terminated Vested	48,102	48,102
Survivor	7,148	7,148
Total Inactives	**$137,583**	**$137,583**
2018 Total	**$190,705**	**$194,454**
2017 Total	**$190,185**	**$194,037**

**Includes pension benefits only.*

***Entry Age Normal Actuarial Accrued Liability.*

Note: Totals may not agree due to rounding.

Present Value of Benefits - Relief Plan*	
(Dollars in Thousands)	
Liability Measures	**Fully Projected**
Active Members	
Duty Disability	$1,147
Duty-Related Death	1,436
Medical and Temporary Disability	10,898
Total Actives	**$13,481**
Inactive Members	
Survivor	$2,205
Disability	2,493
Total Inactives	**4,699**
2018 Total	**$18,180**
2017 Total	**$18,419**

**Includes relief benefits only.*

Note: Totals may not agree due to rounding.

Pension - Fully Projected Benefit Payments

(Dollars in Thousands)

Year	Future Value	Present Value	Year	Future Value	Present Value	Year	Future Value	Present Value
2018	$12,167	$11,762	**2052**	$9,466	$917	**2086**	$893	$9
2019	12,773	11,540	**2053**	9,102	824	**2087**	779	7
2020	13,250	11,188	**2054**	8,778	743	**2088**	673	6
2021	13,640	10,764	**2055**	8,455	669	**2089**	576	5
2022	14,051	10,363	**2056**	8,111	599	**2090**	488	4
2023	14,406	9,930	**2057**	7,813	540	**2091**	409	3
2024	14,743	9,497	**2058**	7,514	485	**2092**	338	2
2025	14,964	9,009	**2059**	7,211	435	**2093**	275	2
2026	15,167	8,534	**2060**	6,929	391	**2094**	221	1
2027	15,342	8,068	**2061**	6,649	350	**2095**	175	1
2028	15,435	7,585	**2062**	6,380	314	**2096**	136	1
2029	15,490	7,115	**2063**	6,103	281	**2097**	104	0
2030	15,491	6,649	**2064**	5,806	250	**2098**	78	0
2031	15,419	6,185	**2065**	5,502	221	**2099**	57	0
2032	15,309	5,740	**2066**	5,187	195	**2100**	42	0
2033	15,184	5,320	**2067**	4,877	171	**2101**	30	0
2034	15,053	4,929	**2068**	4,576	150	**2102**	21	0
2035	14,882	4,554	**2069**	4,286	131	**2103**	14	0
2036	14,664	4,194	**2070**	4,007	115	**2104**	10	0
2037	14,415	3,853	**2071**	3,738	100	**2105**	6	0
2038	14,147	3,534	**2072**	3,479	87	**2106**	4	0
2039	13,889	3,243	**2073**	3,230	76	**2107**	3	0
2040	13,641	2,977	**2074**	2,991	65	**2108**	2	0
2041	13,373	2,727	**2075**	2,762	56	**2109**	1	0
2042	13,081	2,493	**2076**	2,543	49	**2110**	1	0
2043	12,758	2,272	**2077**	2,334	42	**2111**	0	0
2044	12,390	2,062	**2078**	2,135	36	**2112**	0	0
2045	12,022	1,870	**2079**	1,947	30	**2113**	0	0
2046	11,639	1,692	**2080**	1,767	26	**2114**	0	0
2047	11,302	1,536	**2081**	1,598	22	**2115**	0	0
2048	10,930	1,388	**2082**	1,438	18	**2116**	0	0
2049	10,594	1,257	**2083**	1,288	15	**2117**	0	0
2050	10,208	1,132	**2084**	1,147	13			
2051	9,839	1,020	**2085**	1,016	11	**Total**	**$627,161**	**$194,454**

Relief - Fully Projected Benefit Payments

(Dollars in Thousands)

Year	Future Value	Present Value	Year	Future Value	Present Value	Year	Future Value	Present Value
2018	$2,169	$2,097	**2052**	$447	$43	**2086**	$116	$1
2019	1,992	1,800	**2053**	424	38	**2087**	108	1
2020	1,849	1,561	**2054**	403	34	**2088**	101	1
2021	1,726	1,362	**2055**	382	30	**2089**	92	1
2022	1,622	1,196	**2056**	362	27	**2090**	84	1
2023	1,535	1,058	**2057**	345	24	**2091**	77	1
2024	1,458	939	**2058**	328	21	**2092**	69	0
2025	1,390	837	**2059**	313	19	**2093**	61	0
2026	1,329	748	**2060**	300	17	**2094**	54	0
2027	1,274	670	**2061**	287	15	**2095**	47	0
2028	1,223	601	**2062**	276	14	**2096**	40	0
2029	1,176	540	**2063**	265	12	**2097**	34	0
2030	1,129	485	**2064**	255	11	**2098**	29	0
2031	1,087	436	**2065**	247	10	**2099**	24	0
2032	1,048	393	**2066**	240	9	**2100**	19	0
2033	1,012	355	**2067**	234	8	**2101**	16	0
2034	977	320	**2068**	229	8	**2102**	12	0
2035	943	289	**2069**	224	7	**2103**	10	0
2036	911	261	**2070**	219	6	**2104**	7	0
2037	880	235	**2071**	213	6	**2105**	6	0
2038	850	212	**2072**	208	5	**2106**	4	0
2039	818	191	**2073**	203	5	**2107**	3	0
2040	785	171	**2074**	197	4	**2108**	2	0
2041	751	153	**2075**	192	4	**2109**	1	0
2042	716	136	**2076**	186	4	**2110**	1	0
2043	682	122	**2077**	180	3	**2111**	1	0
2044	653	109	**2078**	173	3	**2112**	0	0
2045	626	97	**2079**	167	3	**2113**	0	0
2046	599	87	**2080**	160	2	**2114**	0	0
2047	572	78	**2081**	154	2	**2115**	0	0
2048	546	69	**2082**	147	2	**2116**	0	0
2049	520	62	**2083**	139	2	**2117**	0	0
2050	494	55	**2084**	132	1			
2051	470	49	**2085**	124	1	**Total**	**$45,190**	**$18,180**

ASSETS

Change in Market Value of Assets	
(Dollars in Thousands)	
Market Value as of June 30, 2017	**$229,799**
Revenue	
Member Pension Contributions	$65
Employer Pension Contributions	383
Relief Plan Contributions	440
Investment Earnings Net of Expenses	20,342
Net Fire Insurance Premium Tax (Net FIPT)*	7,227
Total Revenue	**$28,456**
Disbursements	
Refunds	$32
Expenses	2
Disability and Survivor Benefits	611
Miscellaneous	0
Medical Benefits	938
Retirement Pensions (monthly and lump sums)	11,390
Total Disbursements	**$12,973**
Market Value as of June 30, 2018	**$245,282**

**Excludes $500k allocated to the administrative account by BVFF. Actual administrative costs for the prior year were approximately $472k.*

Note: Totals may not agree due to rounding.

Calculation of the Actuarial Value of Assets				
(Dollars in Thousands)				
Assets as of June 30, 2017				
a. Market Value of Assets				$229,799
b. Deferred Investment Gains (Losses)				17,443
c. Actuarial Value of Assets (a - b)				$212,356
d. Ratio of Actuarial Value to Market Value (c / a)				92%
Assets as of June 30, 2018				
a. Market Value at 6/30/2018				**$245,282**
b. Deferred Gains and (Losses)				
Plan Year Ending	**Original Deferred Gain/Loss**	**Years Deferred**	**Years Remaining**	**Current Deferred Gain/Loss**
6/30/2018	4,322	2	1	2,161
6/30/2017	12,591	7	5	8,994
6/30/2016	(9,146)	5	2	(3,658)
6/30/2015	(5,125)	3	0	0
6/30/2014	20,028	8	3	7,511
6/30/2013	7,845	5	0	0
6/30/2012	(8,636)	6	0	0
Total Deferral				**$15,007**
c. Market Value less Deferral (a - b)				**$230,275**
d. 70% of Market Value of Assets				171,697
e. 130% of Market Value of Assets				318,867
f. Actuarial Value of Assets*				**$230,275**
g. Ratio of Actuarial Value to Market Value (f / a)				**94%**

**The AVA may not exceed 130% nor drop below 70% of the AVA.*

Note: Totals may not agree due to rounding.

The Board established the plan's asset fund to pay for both pension and relief benefits. They chose to allocate the assets to pensions up to the AAL for the pension plan with any remaining assets allocated to relief benefits. The following table summarizes the allocation of the assets to the pension and relief plans[2].

Allocation of Actuarial Value of Assets by Plan			
(Dollars in Millions)	**Pension**	**Relief**	**Total**
June 30, 2018	**$190.7**	**$39.6**	**$230.3**
June 30, 2017	190.2	$22.2	212.4
June 30, 2016	190.0	$10.8	200.8
June 30, 2015	188.5	$6.0	194.5
June 30, 2014	185.5	$3.5	189.0
June 30, 2013	182.5	$0.0	182.5
June 30, 2012	170.3	$7.4	177.6
June 30, 2011	167.8	$5.8	173.6
June 30, 2010	$165.6	$3.1	$168.8

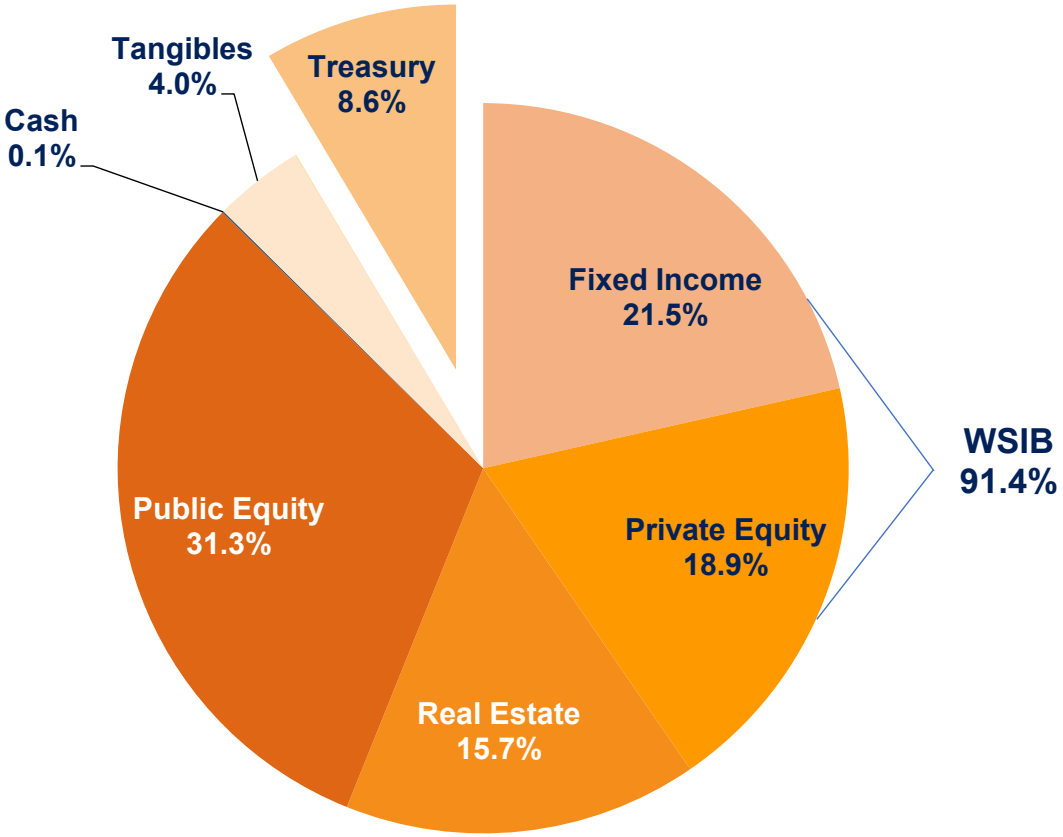
The assumed 7.0 percent investment Rate of Return (ROR) for the plan assets is based upon a weighted average of the expected ROR for the assets in the OST and the WSIB accounts. Assets held by the OST are invested in short-term bonds. On a long-term basis, we expect the OST investments to earn 3.5 percent per year and the WSIB investments to earn 7.4 percent per year net of expenses. Our office discussed the reasonableness of the OST investment assumption with OST as part of the

[2]*The June 30, 2010, AVR was the first report that allocated a portion of the assets to the relief plan. Prior to that report, all assets were allocated to pensions.*

2017 VFF Actuarial Valuation Report. The WSIB investment assumption is consistent with our long-term expectations from the most recent *Economic Experience Study*.

The distribution of total plan assets between each account fluctuates by year and is monitored by the Board to ensure adequate assets in the OST account to make benefit payments. Currently, the Board has a target of investing 90 percent of its assets with WSIB and 10 percent of its assets with OST. The graph below shows details of the asset allocation for the plan.

Asset Allocation as of June 30, 2018



Note: Innovation allocation was 0.05%.
Source: Washington State Investment Board.

To help track annual funding, we developed a table that compares the actuarial required costs of the plan to the expected income for the upcoming year. A surplus income means the plan is expected to collect more income than benefits that are earned (or accrued) in the given year.

2019 Actuarial Required Costs Vs. Expected Income			
(Dollars in Thousands)			
Pension and Relief Plans			
Actuarial Required Costs	**Count**	**Rate (*$ in Ones*)***	**Total**
Entry Age Normal Cost	8,960	$100	$900
UAAL (Surplus)	8,960	$0	0
Total Pension			**$900**
Relief Aggregate Normal Cost	10,785	$0	0
Total Actuarial Costs			**$900**
Income	**Count**	**Rate (*$ in Ones*)**	**Total**
State			
Expected Net FIPT**			**$7,371**
Pension			
VFF Member	8,811	$30	$264
VFF Employer	8,811	$30	264
RLEOs and EMTs	149	$135	20
Total Pension			**$549**
Relief			
VFF Employer	10,598	$30	$318
RLEOs and EMTs	187	$235	44
Total Relief			**$362**
Total Income			**$8,282**
Surplus (Deficit) Income			**$7,382**

** Assumes $0 contribution rate if the plan is in a surplus funded position.*

***Assumes 2% growth from prior year's net FIPT which is approximately the ten-year average annual growth.*

Note: Totals may not agree due to rounding.

FUNDED STATUS

We report a plan's funded status by comparing the plan's current assets to today's value of the earned pensions of its members. For this valuation report, we present the funded status on an Actuarial Value Basis (AVB). This measure compares the AVA to the pension plan's EAN accrued liabilities calculated using a long-term interest rate assumption.

The funded status on an AVB assumes the plan is on-going and therefore uses the same long-term assumptions and methods to develop the assets and liabilities as used in determining the contribution requirements of the plan. We do not 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.

We 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 of 7.0 percent. The AVA provides a more stable measure of the plan's assets on an on-going basis.

We use the EAN actuarial cost method to determine the present value of earned pensions (or accrued liability). The accrued liability is based on the difference between the pension's PVFB and the pension's Present Value of Future Normal Cost (PVFNC). In other words, the accrued liability is the difference between today's value of all projected pension benefits paid by the plan and today's value of the future normal costs required by the pension plan's actuarial funding method. The EAN cost method determines each year's normal cost as a level annual amount that, if collected from each member's entry age to their projected retirement age, would completely fund their projected pension benefits. The EAN liabilities are discounted to the valuation date using the valuation interest rate to determine the present value (today's value). The valuation interest rate is consistent with the long-term expected return on invested contributions.

The funded status serves as an independent measure to assess the pension system's funding progress and is a consistent measure to compare to the funded statuses of other retirement systems. However, differences in assumptions between retirement systems can diminish the value of such comparisons.

Based on the funding policy adopted by the Board starting with the *June 30, 2010, Actuarial Valuation*, any assets above the pension plan AAL are allocated to fund the relief benefits. As a result, the funded status of the pension plan would remain 100 percent when total assets exceed the pension plan AAL.

Pension Funded Status on Actuarial Value Basis	
(Dollars in Thousands)	
Entry Age Normal Accrued Liability	$190,705
Actuarial Value of Assets	190,705
Unfunded Liability	$0
Funded Ratio	
June 30, 2018	**100%**
June 30, 2017*	100%
June 30, 2016	100%
June 30, 2015*	100%
June 30, 2014*	100%
June 30, 2013*	99%
June 30, 2012	100%
June 30, 2011	100%
June 30, 2010	100%
June 30, 2009**	102%

**Actuarial assumptions changed.*

***Benefits increased.*

Note: Beginning with the 2010 valuation, excess assets above the Pension AAL are allocated to Relief benefits.

We do not calculate an actuarial accrued liability for the relief plan since the relief benefits are paid as they are incurred. A member cannot earn (or accrue) additional relief benefits as their service increases. As such, a funded status is not calculated for relief. Please see the Development of Relief Plan Normal Cost for a comparison of the Present Value of Future Relief Benefits to the assets on hand for (allocated to) relief benefits.

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 may 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.

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.

The present value of actuarial liabilities is sensitive to the interest rate assumption. The following table shows how the funded status changes when we use different interest rate assumptions. We calculated the liabilities using a 6.25 percent and 7.75 percent ROR to show this sensitivity.

Pension Funded Status at Variable Interest Rate Assumptions			
(Dollars in Thousands)	6.25% ROR	7.00% ROR	7.75% ROR
Entry Age Normal Accrued Liability	$207,422	$190,705	$176,225
Actuarial Value of Assets	207,422	190,705	176,225
Unfunded Liability	$0	$0	$0
Funded Ratio			
June 30, 2018	**100%**	**100%**	**100%**
June 30, 2017*	100%	100%	100%
June 30, 2016	97%	100%	100%
June 30, 2015*	94%	100%	100%
June 30, 2014*	93%	100%	100%
June 30, 2013*	91%	99%	100%
June 30, 2012	96%	100%	100%
June 30, 2011	95%	100%	100%
June 30, 2010	93%	100%	100%
June 30, 2009**	93%	102%	111%

**Actuarial assumptions changed.*

***Benefits increased.*

Note: Beginning with the 2010 valuation, excess assets above the Pension AAL are allocated to Relief benefits.

ECONOMIC EXPERIENCE

The economic experience will reflect the current economic, financial, and inflationary environment. These factors can change more rapidly than the factors affecting our demographic assumptions.

- **Investment Returns —** We assume future investments return a rate of 7.0 percent per year, net of expenses. The investment return assumption represents the average annual rate of return we expect the assets of the plan to earn over the long-term. Actual annual investment performance over short-term periods will deviate from this long-term assumption. The table at right displays the dollar-weighted annual ROR over the last ten years, which shows the short-term volatility of the investment returns.

  To reduce volatility on contribution rates and reported funded status, the Board adopted an asset smoothing method that limits short-term fluctuation due to the underlying volatility in the MVA.

Annual Rate of Return	
Year	
2018	8.93%
2017	13.23%
2016	2.48%
2015	4.42%
2014	18.69%
2013	11.97%
2012	1.64%
2011	19.18%
2010	10.38%
2009	(17.09%)
10-Year Average Return*	
Average	6.87%

**Based on Geometric Return.*

- **Premium Tax —** The state's contribution to the plan is made through the premium tax paid on fire insurance policies. The level of annual premium tax fluctuates because the amount of the contribution equals the total amount paid by insurers to guarantee associations, which varies from year to year. Each year 40 percent of this premium tax is contributed to the

Premium Taxes Contributed to Plan	
Year	*(Dollars in Thousands)*
2018	$7,227
2017	6,646
2016	7,235
2015	5,903
2014	6,383
2013	5,958
2012	5,602
2011	5,815
2010	5,685
2009	5,794
2008	$5,853
10-Year Annual Growth*	
Average	**2.1%**

**Based on Geometric Return.*
Note: Premium Taxes shown above are net of administrative expenses.

plan, and this amount has historically been split between an administrative fund and a pension fund. Only the pension fund portion is used to calculate contribution rates.

DEMOGRAPHIC EXPERIENCE

The table below displays the various ways members enter and exit the VFF system. For each, we compare the actual counts to our expected counts over the 2018 valuation period, and calculate the ratio of the two in the "Act/Exp" column. Due to the relatively small population of the VFF system, we do expect to see some variation in these ratios on an annual basis. However, over the long term, we anticipate that our expected counts for each will model the actual counts closely, with the exception of new entrants since our valuations do not assume new members join the system. To help ensure our expected counts for each mode of exit are reasonable, we re-evaluate how we calculate these as part of our demographic experience studies.

Actual Vs. Expected Demographic Counts			
	Actual	Expected	Act/Exp
New Entrants	1,553	N/A	N/A
Retirements	80	233	0.34
Terminations	1,465	1,113	1.32
Active Deaths	7	22	0.31
Active Disabilities	0	0	0.00
Inactive Deaths*	208	161	1.29

**Excludes terminated and vested records.*

ACTUARIAL GAIN/LOSS

Since the 2017 VAVR, the key actuarial gains and losses impacted the results of this valuation as follows.

- **Pension Normal Cost Rate changed by less than a dollar.**

  New members joining the system increases the plan liabilities and also PVFS. This results in a net actuarial loss. The net impact of the new members, along with other liabilities gains/losses (for example, higher member turnover than expected), results in a slight decrease in rates.

- **Pension UAAL Rate remains at zero.**

  The AVA continues to exceed the accrued pension liability, so the pension UAAL remains at zero. The AVA amount that exceeds the accrued pension liability is included in the calculation of the relief contribution rate.

- **Relief Normal Cost Rate experienced a net decrease.**

  New members joining the system increases the plan liabilities and also PVFS[3] which outweigh the liability decreases from termination, disability, and mortality (specifically, higher member turnover than expected and fewer active duty-related disablements and deaths than expected). These gains/losses are surpassed by large gains on assets from higher than expected returns and excess assets shifted to the relief plan.

Change in Pension Normal Cost Rate by Source*	
2017 Pension Normal Cost Rate	**$100.44**
Liabilities	
Termination	($5.97)
Retirement	0.46
Mortality	0.23
Growth / Return to Work	16.85
Other Liabilities	1.22
Total Liabilities (Gains) / Losses	**$12.79**
PV of Future Service (Gains) / Losses	**($12.81)**
Other (Gains) / Losses	**$0.00**
Total Change	**($0.02)**
2018 Preliminary Pension NC Rate (Before 2019 Changes)	**$100.42**
Incremental Changes	
Plan Changes	0.00
Method Changes	0.00
Assumption Changes	0.00
Correction Changes	0.00
Total Incremental Changes (Gains) / Losses	**$0.00**
Laws of 2019	0.00
2018 Pension Normal Cost Rate	**$100.42**

**Please see the Actuarial Methods section for details on the modified version of the EAN cost method used. Non-standard sources of annual gain/loss are produced as a result.*

[3] *An increase in PVFS results in rates converging to zero. In other words, an increase in PVFS for a contribution rate above zero will result in a gain, but the opposite is true if the rate is below zero.*

Change in Pension UAAL Rate by Source	
2017 Pension UAAL Rate	$0.00
Liabilities	
Termination	($10.26)
Retirement	(2.44)
Mortality	
Active	1.91
Inactive	(18.04)
Growth / Return to Work	8.26
Other Liabilities	(0.66)
Total Liabilities (Gains) / Losses	**($21.24)**
Assets	
Investment Return	($205.05)
Allocation of Excess Pension Assets*	226.28
Total Assets (Gains) / Losses	**$21.24**
Other (Gains) / Losses	**$0.00**
Total Change	**$0.00**
2018 Preliminary Pension UAAL Rate (Before 2019 Changes)	$0.00
Incremental Changes	
Plan Changes	$0.00
Method Changes	0.00
Assumption Changes	0.00
Corrections	0.00
Total Incremental Changes (Gains) / Losses	**$0.00**
Laws of 2019	0.00
2018 Pension UAAL Rate	**$0.00**

**Based on the funding policy adopted by the Board, assets are allocated to pension benefits first (up to the pension plan accrued liability), and to relief second.*

Change in Relief Normal Cost Rate by Source	
2017 Relief Normal Cost Rate	**($69.67)**
Liabilities	
Termination	($21.57)
Retirement	0.01
Disability	(4.24)
Mortality	
Active	(5.50)
Inactive	(2.16)
Growth / Return to Work	49.53
Other Liabilities	0.74
Total Liabilities (Gains) / Losses	**$16.82**
Assets	
Investment Return	($33.51)
Allocation of Excess Pension Assets*	(342.45)
Total Assets (Gains) / Losses	**($375.96)**
PV of Future Service (Gains) / Losses	**$37.47**
Other (Gains) / Losses	**$0.00**
Total Change	**($321.67)**
2018 Preliminary Relief NC Rate (Before 2019 Changes)	**($391.34)**
Incremental Changes	
Plan Changes	$0.00
Method Changes	(19.63)
Assumption Changes	(1.46)
Correction Changes	0.00
Total Incremental Changes (Gains) / Losses	**($21.09)**
Laws of 2019	0.00
2018 Relief Normal Cost Rate	**($412.43)**

**Based on the funding policy adopted by the Board, assets are allocated to pension benefits first (up to the pension plan accrued liability), and to relief second.*

EFFECT OF PLAN, METHOD, ASSUMPTION, AND CORRECTION CHANGES

Plan Changes

- None.

Method Changes

- **Adjustment to the Calculation of AVA** — We updated our methodology for calculating asset gains and losses based on a more accurate estimate of the OST cash flows net of investment returns.

Assumption Changes

- **Medical Trend Rates** — The medical inflation rates were updated for consistency with our most recently published *2018 Other Postemployment Benefits (OPEB) Actuarial Valuation Report*. We rely on the Uniform Medical Plan Non-Medicare Costs trend (without excise tax) from this OPEB report to project inflation on medical payments that will be paid as a relief benefit.

Corrections

- None.

Per Person Annual Contribution Rates				
Valuation Year	2017	Changes to Data & Assets*	Changes to Assumptions & Methods**	2018
		Pension Rate		
Normal Cost Rate	$100	($0)	$0	$100
UAAL Rate	0	0	0	0
Total Pension Rate	**$100**	**($0)**	**$0**	**$100**
		Relief Rate		
Normal Cost Rate	**($70)**	**($322)**	**($21)**	**($412)**

**This represents the impact on contribution rates resulting from updated asset values and demographics of the VFF population from the previous valuation date.*

***This represents the impact on contribution rates attributable to corrections and plan, assumption, and method changes.*

Section Three: Participant Data

PARTICIPANT DATA

Membership Data					
Actives	**2014**	**2015**	**2016**	**2017**	**2018**
Number of Members in Relief System	**12,151**	**11,831**	**11,532**	**11,184**	**10,785**
Average Age	40.4	40.7	40.8	41.2	41.2
Average Total Service	9.6	9.7	9.6	9.7	9.5
Number of Emergency Medical Technicians	73	62	65	62	47
Number of Reserve Law Enforcement Officers	227	216	190	162	140
Number of Rehires Receiving a Pension	54	82	76	93	70
Number of Members in Pension System	**10,093**	**9,802**	**9,434**	**9,223**	**8,960**
Percent of Volunteers Covered	83%	83%	82%	82%	83%
Average Age	41.5	41.6	41.9	42.1	42.1
Average Total Service	10.8	10.8	10.8	10.8	10.6
Average Pension Benefit Service	8.9	8.9	9.0	9.0	8.9
Number of Emergency Medical Technicians	35	28	30	26	22
Number of Reserve Law Enforcement Officers	198	185	158	137	127
Retirees					
Number of Retirees/Beneficiaries	**4,208**	**4,296**	**4,367**	**4,446**	**4,494**
Average Age	74.6	75.0	74.9	75.0	75.2
Number of New Retirees	220	180	202	216	205
Average Annual Benefit	$2,217	$2,232	$2,245	$2,266	$2,287
Total Annual Benefit Payments *($ in M)*	$9.3	$9.6	$9.8	$10.1	$10.3
Terminated Vested					
Number of Terminated Vested	**6,092**	**6,197**	**6,263**	**6,120**	**6,181**
Relief Annuities					
Number of Duty-Death Survivors	**11**	**11**	**11**	**9**	**8**
Average Age	71.6	69.2	67.7	70.9	70.1
Average Annual Benefit	$21,425	$21,718	$22,045	$22,260	$22,736
Number of Duty-Related Disabled	**14**	**12**	**12**	**12**	**11**
Average Age	67.6	67.0	68.0	69.0	68.7
Average Annual Benefit	$24,184	$24,256	$24,252	$24,118	$23,976

Pension Active Members - Age and Membership Service Distribution										
Membership	**Attained Age**									
Service	**< 25**	**25-29**	**30-34**	**35-39**	**40-44**	**45-49**	**50-54**	**55-59**	**60+**	**Total**
1	415	189	168	111	87	55	39	27	45	**1,136**
2	335	165	126	103	70	46	32	35	47	**959**
3-4	333	259	224	148	127	93	68	68	86	**1,406**
5-9	152	339	294	252	240	178	139	103	206	**1,903**
10-14	0	72	148	215	188	165	148	110	139	**1,185**
15-19	0	0	62	114	160	120	132	107	160	**855**
20-24	0	0	0	33	101	99	117	114	157	**621**
25 +	0	0	0	0	29	82	140	252	392	**895**
Total	**1,235**	**1,024**	**1,022**	**976**	**1,002**	**838**	**815**	**816**	**1,232**	**8,960**

Relief Active Members - Age and Membership Service Distribution										
Membership Service	Attained Age									
	< 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60+	Total
1	790	386	295	204	148	90	55	54	93	**2,115**
2	445	221	172	127	82	59	41	47	64	**1,258**
3-4	383	301	247	167	138	100	77	76	112	**1,601**
5-9	160	363	318	265	249	189	151	119	262	**2,076**
10-14	0	75	155	218	191	170	155	123	177	**1,264**
15-19	0	0	62	116	161	122	132	108	169	**870**
20-24	0	0	0	33	101	99	117	116	166	**632**
25 +	0	0	0	0	29	82	140	256	462	**969**
Total	**1,778**	**1,346**	**1,249**	**1,130**	**1,099**	**911**	**868**	**899**	**1,505**	**10,785**

Pension Retirees*					
Age	Number of Retirees	Average Annual Benefit	Age	Number of Retirees	Average Annual Benefit
60	34	$1,390	**76**	225	$2,272
61	12	1,772	**77**	196	2,288
62	28	1,622	**78**	163	2,218
63	39	2,026	**79**	165	2,240
64	58	2,030	**80**	169	2,032
65	119	2,559	**81**	170	2,094
66	179	2,501	**82**	130	2,212
67	200	2,576	**83**	121	2,092
68	220	2,445	**84**	109	2,253
69	217	2,389	**85**	97	2,322
70	213	2,351	**86**	88	2,135
71	268	2,310	**87**	64	2,202
72	243	2,341	**88**	77	2,153
73	224	2,350	**89**	56	2,250
74	205	2,324	**90 +**	180	2,259
75	225	$2,331	**Total**	**4,494**	**$2,287**

**Includes beneficiaries of service retirees.*

Line-of-Duty Death Survivors		
Age	Number of Survivors	Average Annual Benefit
<60	2	$22,736
60-74	2	22,736
75-89	4	22,736
90+	0	0
Total	**8**	**$22,736**

Retirees with Disabilities		
Age	Number of Survivors	Average Annual Benefit
<60	1	$22,736
60-74	6	24,251
75-89	4	23,872
90+	0	0
Total	**11**	**$23,976**

Section Four: Appendices

ACTUARIAL ASSUMPTIONS

Decrement Rates

- **Disability Rates —** To value disability benefits under the relief plan, we used the duty disability rates developed for the *2018 Relief Experience Study*. We assume a rate of duty disablement of 0.05 percent for all active members.
- **Termination Rates —** Termination rates are modeled as a function of Membership Service. Rates increase at 25 years when members reach the maximum pension benefit level.
- **Retirement Rates —** Retirement rates begin at age 60 for active members. We assume that terminated members with vested benefits will defer retirement to age 65.

Probability of Retirement*		
Age	MS** < 25	MS >= 25
59	0%	0%
60	7%	7%
61	9%	9%
62	11%	11%
63	9%	9%
64	12%	12%
65	38%	90%
66-79	19%	90%
80	100%	100%

**For calculating the Pension PVFS, we assume 100% retirement at 25 years of service.*

***Membership Service.*

- **Mortality Rates —** We use the Public Employees' Retirement System (PERS) mortality rates for the VFF plan. The PERS rates are based on the RP-2000 Combined Healthy and RP-2000 Disabled Mortality Tables with generational improvements using 100 percent of Scale BB with age offsets (-1 for male, -1 for females). The Society of Actuaries published both the RP-2000 and Scale BB tables. Please see our website for the actuarial valuation report, which contains more details on the development of these tables.

Probability of Termination	
Service Years*	All Ages
0	17%
1	18%
2	19%
3	19%
4	18%
5	15%
6	14%
7	13%
8	12%
9	11%
10	10%
11	9%
12	9%
13	9%
14	9%
15	7%
16	6%
17	6%
18	6%
19	5%
20	5%
21	5%
22	5%
23	6%
24	8%
25	13%
26	11%
27+	9%

**The service based reduction factors for pension benefits improve at 10, 15, 20, and 25 years of membership service. For calculating the Pension PVFS, we assume 100% termination at 25 years of service.*

Base Mortality Rates and Projection Scale									
	RP-2000 Healthy		100% Scale BB*			RP-2000 Healthy		100% Scale BB*	
Age	Male	Female	Male	Female	Age	Male	Female	Male	Female
19	0.000000	0.000000	0.000	0.000	42	0.001215	0.000852	0.003	0.003
20	0.000345	0.000191	0.003	0.003	43	0.001299	0.000937	0.003	0.003
21	0.000357	0.000192	0.003	0.003	44	0.001397	0.001029	0.003	0.003
22	0.000366	0.000194	0.003	0.003	45	0.001508	0.001124	0.003	0.003
23	0.000373	0.000197	0.003	0.003	46	0.001616	0.001223	0.003	0.003
24	0.000376	0.000201	0.003	0.003	47	0.001734	0.001326	0.003	0.003
25	0.000376	0.000207	0.003	0.003	48	0.001860	0.001434	0.003	0.003
26	0.000378	0.000214	0.003	0.003	49	0.001995	0.001550	0.003	0.003
27	0.000382	0.000223	0.003	0.003	50	0.002138	0.001676	0.003	0.003
28	0.000393	0.000235	0.003	0.003	51	0.002449	0.001852	0.003	0.003
29	0.000412	0.000248	0.003	0.003	52	0.002667	0.002018	0.003	0.003
30	0.000444	0.000264	0.003	0.003	53	0.002916	0.002207	0.003	0.003
31	0.000499	0.000307	0.003	0.003	54	0.003196	0.002424	0.003	0.004
32	0.000562	0.000350	0.003	0.003	55	0.003624	0.002717	0.003	0.005
33	0.000631	0.000394	0.003	0.003	56	0.004200	0.003090	0.003	0.006
34	0.000702	0.000435	0.003	0.003	57	0.004693	0.003478	0.004	0.007
35	0.000773	0.000475	0.003	0.003	58	0.005273	0.003923	0.005	0.008
36	0.000841	0.000514	0.003	0.003	59	0.005945	0.004441	0.006	0.009
37	0.000904	0.000554	0.003	0.003	60	0.006747	0.005055	0.007	0.010
38	0.000964	0.000598	0.003	0.003	61	0.007676	0.005814	0.008	0.011
39	0.001021	0.000648	0.003	0.003	62	0.008757	0.006657	0.009	0.012
40	0.001079	0.000706	0.003	0.003	63	0.010012	0.007648	0.010	0.012
41	0.001142	0.000774	0.003	0.003	64	0.011280	0.008619	0.011	0.012

**Scale BB represents annual improvements in mortality rates.*

Base Mortality Rates and Projection Scale (continued)									
	RP-2000 Healthy		100% Scale BB*			RP-2000 Healthy		100% Scale BB*	
Age	Male	Female	Male	Female	Age	Male	Female	Male	Female
65	0.012737	0.009706	0.012	0.012	88	0.150590	0.107303	0.013	0.012
66	0.014409	0.010954	0.013	0.012	89	0.166420	0.119154	0.012	0.012
67	0.016075	0.012163	0.014	0.012	90	0.183408	0.131682	0.011	0.011
68	0.017871	0.013445	0.015	0.012	91	0.199769	0.144604	0.010	0.010
69	0.019802	0.014860	0.015	0.012	92	0.216605	0.157618	0.009	0.009
70	0.022206	0.016742	0.015	0.012	93	0.233662	0.170433	0.008	0.008
71	0.024570	0.018579	0.015	0.012	94	0.250693	0.182799	0.007	0.007
72	0.027281	0.020665	0.015	0.012	95	0.267491	0.194509	0.006	0.006
73	0.030387	0.022970	0.015	0.012	96	0.283905	0.205379	0.005	0.005
74	0.033900	0.025458	0.015	0.012	97	0.299852	0.215240	0.004	0.004
75	0.037834	0.028106	0.015	0.012	98	0.315296	0.223947	0.004	0.004
76	0.042169	0.030966	0.015	0.012	99	0.330207	0.231387	0.003	0.003
77	0.046906	0.034105	0.015	0.012	100	0.344556	0.237467	0.003	0.003
78	0.052123	0.037595	0.015	0.012	101	0.358628	0.244834	0.002	0.002
79	0.057927	0.041506	0.015	0.012	102	0.371685	0.254498	0.002	0.002
80	0.064368	0.045879	0.015	0.012	103	0.383040	0.266044	0.001	0.001
81	0.072041	0.050780	0.015	0.012	104	0.392003	0.279055	0.001	0.001
82	0.080486	0.056294	0.015	0.012	105	0.397886	0.293116	0.000	0.000
83	0.089718	0.062506	0.015	0.012	106	0.400000	0.307811	0.000	0.000
84	0.099779	0.069517	0.015	0.012	107	0.400000	0.322725	0.000	0.000
85	0.110757	0.077446	0.015	0.012	108	0.400000	0.337441	0.000	0.000
86	0.122797	0.086376	0.015	0.012	109	0.400000	0.351544	0.000	0.000
87	0.136043	0.096337	0.014	0.012	110	1.000000	1.000000	0.000	0.000

*Scale BB represents annual improvements in mortality rates.

Pension Benefit Assumptions

- **Purchase of Membership Service Credit —** We assume all eligible members will purchase service credit for each year they did not make past pension contributions. As a result, we value all benefits, except for return of contributions, with eligibility and benefit amounts based on membership service instead of benefit service.
- **Ratio of Survivors Selecting Annuities —** Upon the death of a terminated vested member, we assume 31 percent of members will have a surviving spouse who elects to receive a pension annuity. This assumption includes both the probability that the member has a spouse, and the probability that the spouse elects to receive an annuity (instead of a return of contributions). Upon the death of an active member, we assume this probability increases with age as shown in the table to the right. These assumptions are consistent with those selected for PERS 2.
- **Joint and Survivor Reduction Factor —** We assume a reduction factor of 0.836 will be applied to joint and survivor pension

Ratio of Survivors Selecting Annuities	
Age	Rate
39	0.00%
40	2.11%
45	13.85%
50	25.66%
55	37.46%
60	49.27%
62+	57.30%

Note: This assumption has been blended based upon our 90% Male assumption for display purposes only.

annuities. We base this assumption on the assumed age difference between male and female members and their spouses. We assume male members are three years older and female members are one year younger than their spouses, consistent with PERS 2.

Relief Benefit Assumptions

Unless noted otherwise, the following assumptions were developed in the *2018 Relief Experience Study*.

- **Medical Costs** — We assume the following per person costs and annual inflation as described by the following table.

Medical Benefit Assumptions		
Assumption	**Per Person Costs**	**Assumed Inflation**
Medical Claims	$122.71	Medical Inflation
Member Physicals	$11.00	0.00%
Temporary Disability	$10.25	2.50%

- **Annual Medical Inflation** — To estimate future medical costs, we chose to apply the medical inflation assumptions from our *2018 OPEB Actuarial Valuation Report*. Based on the self-insured nature of the VFF relief plan, we assume the medical inflation is consistent with the Uniform Medical Plan Non-Medicare Costs trend, excluding the provision for excise taxes since we assume they do not apply to this plan.

Medical Inflation	
Valuation Year	**Rate**
2018	7.7%
2019	6.3%
2020	6.0%
2021-2022	5.2%
2023-2025	5.3%
2026-2033	5.4%
2034-2042	5.5%
2043-2044	5.4%
2045-2048	5.3%
2049-2060	5.2%
2061-2064	5.1%
2065	5.0%
2066	4.9%
2067-2068	4.8%
2069	4.7%
2070	4.6%
2071-2072	4.5%
2073+	4.4%

- **Annual Cost-of-Living Adjustment (COLA)** — We assume a 2.50 percent annual COLA for applicable annuity-based benefits since they are fully indexed benefits. COLAs provided for the relief benefits are based on the change in the Consumer Price Index (CPI) for U.S. Urban Wage Earners and Clerical Workers. COLAs are applied to temporary and permanent disability payments. Additionally, spouses and/or children of permanently disabled VFF relief members and spouses and/or children of VFF relief members killed in the line of duty will receive COLAs on their benefits. We intend to revisit this assumption as part of the *2019 VFF Actuarial Valuation Report* taking into consideration the analysis from our *2019 Economic Experience Study*, published in August, 2019.
- **Duty-Related Death Rate** — We assume the VFF duty-related death rate is 1/20,000 = 0.005%, which equates to approximately 0.5 expected deaths per year. The duty-related death assumption is constant at all ages.
- **Member Duration on Temporary Disability** — We assume members who receive temporary disability benefits will return to active volunteering within six months. These benefits are included in the total relief costs.
- **Percent Married** — We assume that 65 percent of the active population is married. We apply this assumption to the duty-related death and disability annuities provided to the spouse of the member.

- **Duration of Spousal Long-Term Disability Annuity —** We assume a spouse receiving the Long-Term Disability beneficiary annuity will be paid for the member's lifetime. We do not make an assumption for divorce.
- **Duration of Spousal Duty-Related Death Annuity —** We assume a spouse receiving the duty-related death beneficiary annuity will be paid for the spouse's lifetime. We do not make an assumption for remarriage.
- **Child-Related Benefits —** To account for the expected costs of child benefits provided by the plan, we increase member duty-related disability benefits by 5 percent and beneficiary duty-related death benefits by 10 percent.

Miscellaneous Assumptions

- **Valuation Interest Rate —** We assume an annual investment rate of return of 7.0 percent.
- **Percent Male —** We assume the population is 90 percent male, consistent with the Law Enforcement Officers' and Fire Fighters' (LEOFF) Plan 2. We only use this assumption when the gender of a spouse is unknown. Otherwise, we use the gender as reported by the Board.

ACTUARIAL METHODS

Annual Gain/Loss		
Rate of Return	Smoothing Period	Annual Recognition
14% and Up	8 years	12.50%
13-14%	7 years	14.29%
12-13%	6 years	16.67%
11-12%	5 years	20.00%
10-11%	4 years	25.00%
9-10%	3 years	33.33%
8-9%	2 years	50.00%
6-8%	1 year	100.00%
5-6%	2 years	50.00%
4-5%	3 years	33.33%
3-4%	4 years	25.00%
2-3%	5 years	20.00%
1-2%	6 years	16.67%
0-1%	7 years	14.29%
0% and Lower	8 years	12.50%

Note: The AVA may not exceed 130% nor drop below 70% of the MVA.

Asset Valuation Method

An asset valuation method is generally used to adjust the MVA and smooth the effects of short-term volatility. The adjusted assets are called the AVA or valuation assets. The asset valuation method adopted by the Board provides up to eight years of smoothing for asset returns and is used in combination with the funding method (Actuarial Cost Method) described below.

We determine the AVA by adjusting the MVA to reflect the difference between the actual investment return and the expected investment return during each of the last eight years at the following annual recognition rates per year.

Additionally, to ensure the AVA maintains a reasonable relationship to the MVA, a 30 percent corridor is in place. This means the AVA may not exceed 130 percent nor drop below 70 percent of the MVA in any valuation.

Actuarial Cost Method

The Entry Age Normal (EAN) Actuarial Cost Method is comprised of two components:

- Normal Cost (NC).
- Unfunded Actuarial Accrued Liability (UAAL).

We develop the pension contribution rate as the sum of the NC and an amount to amortize the UAAL.

We use the EAN actuarial cost method to develop the pension contribution rates. The Pension NC is the level dollar amount, calculated individually, that would fund each member's pension benefits from their date of entry in the plan to their assumed retirement.

The UAAL represents the excess of the PVFB over the PVFNC and the AVA. In other words, the amount of liabilities that are not covered by the sum of current assets and future contributions.

In equation form: UAAL = PVFB – PVFNC – AVA.

Such an excess can arise for numerous reasons. For example:

- Benefits granted for service prior to establishment of the plan.
- Retroactive benefit increases or benefit improvements.
- Changes to actuarial assumptions and methods.
- Actual experience under the plan that varies from the assumptions.

We developed the UAAL contribution rate in this valuation as a level dollar amount, amortized over a rolling 15-year period. That means we recalculate the UAAL contribution rate each year using a new 15-year period.

We use the Aggregate Funding Method to calculate the relief contribution rates. Compared to the EAN Funding Method, the Aggregate Funding Method does not separately amortize a UAAL. The Relief NC is the level dollar amount that would fund all projected future relief benefits of today's members. The relief plan's NC contribution rate is developed by amortizing the relief's Unfunded PVFB over the Present Value of Future Service (PVFS) of the active relief group. The Unfunded PVFB represents the excess of the PVFB over the AVA allocated to the relief plan.

Present Value of Future Service

The actuarial cost methods utilize the PVFS for all applicable members to calculate the contribution rates. The expected total years of future service depends on when we assume members will leave active service. Our current termination, retirement, disability, and mortality rates reflect our best estimate of the future behavior of relief members.

Currently, the decrement rates extend beyond 25 years of service, which is the maximum number of pension payments members may make. For the purposes of determining the PVFS for pensions, we assume all members leave active service once they reach 25 years of service.

SUMMARY OF PLAN PROVISIONS

The following pension and relief benefits are provided to volunteer fire fighters.

- Optional membership in the retirement plan.
- Duty-related medical benefits.
- Temporary duty-related disability benefits.
- Permanent disability benefits for duty-related injuries.
- Death benefits for duty-related injuries.

These benefits are part of two distinct plans authorized by different sections of statute. The following section summarizes the benefits and contributions established under Chapter 41.24 RCW. This section is for reference only and does not detail the rules and regulations upon which the actuarial calculations are made. The dollars represent 2018 payment amounts.

Participation

RCW 41.24.010 (8)

- **"Participant"** means: (a) For purposes of relief, any reserve officer who is or may become eligible for relief under this chapter or any fire fighter or emergency worker; and (b) for purposes of retirement pension, any fire fighter, emergency worker, or reserve officer who is or may become eligible to receive a benefit of any type under the retirement provisions of this chapter, or whose beneficiary may be eligible to receive any such benefit.

Contributions

- **Pension** — If a member chooses to enroll, he/she contributes $30 annually and the municipality also contributes $30. Municipalities may pay the entire contribution for the member. Reserve law enforcement officers and emergency medical technicians are required to pay the full amount adopted annually by the Board. That amount for the 2019 calendar year was $135.
- **Relief** — VFF members do not make contributions to the relief fund. Municipalities contribute $30 annually on behalf of each member plus 1.5 percent of the annual salary of paid fire fighters not covered under LEOFF. Employers of reserve law enforcement officers and emergency medical technicians are required to pay the full amount adopted annually by the Board. That amount for the 2019 calendar year was $235.
- **Fire Insurance Premium Tax** — 40 percent of the net premium taxes on fire insurance policies are paid into the plan.

Pension Benefits

DEATH BENEFITS

RCW 41.24.180

Non-Duty Death — If the member had less than ten years of service, the spouse will receive a refund of member contributions without interest. If the member had ten or more years of service, the spouse may elect an annuity or a refund of member and employer contributions without interest. The annuity is the member's accrued benefit actuarially adjusted to reflect a

100 percent joint and survivor pension and further actuarially reduced to reflect the difference in the number of years between the fire fighter's age at death and age 65.

RETIREMENT PENSIONS

RCW 41.24.170

- Normal retirement is available at age 65 with at least ten years of membership service. Early retirement eligibility begins at age 60 with ten years of service, with the benefit amount reduced 8 percent per year when retirement occurs prior to age 65. In addition, under normal or early retirement, the pension is reduced for service less than 25 years as shown in the following table.
- The monthly pension benefit formula is:

  ($50 + $10 x Benefit Service) x (Membership Service Factor) x (Age Factor)
- "Benefit Service" is the number of years the member made pension contributions. "Membership Service" is the number of years the member was a member of the relief plan. The maximum monthly pension benefit is $300. There is no automatic post-retirement COLA applied to the benefit.

MEMBERSHIP SERVICE FACTOR FOR RETIREMENT

Membership Service Factor				
Membership Service	10-14	15-19	20-24	25 +
Factor	20%	35%	75%	100%

AGE FACTOR FOR RETIREMENT

Age Factor						
Age	60	61	62	63	64	65
Factor	60%	68%	76%	84%	92%	100%

ACTUARIALLY EQUIVALENT EARLY RETIREMENT REDUCTION FACTORS

We apply these factors to calculate the annuity benefit paid to survivors of active members who die from a non-duty related cause.

Actuarially Equivalent ERFs			
Member's Age	Factor	Member's Age	Factor
<35	10.0%	50	28.9%
35	10.0%	51	31.2%
36	10.6%	52	33.7%
37	11.4%	53	36.4%
38	12.2%	54	39.3%
39	13.1%	55	42.5%
40	14.0%	56	46.0%
41	15.1%	57	49.9%
42	16.2%	58	54.2%
43	17.4%	59	58.8%
44	18.7%	60	64.0%
45	20.0%	61	69.8%
46	21.5%	62	76.1%
47	23.2%	63	83.2%
48	24.9%	64	91.1%
49	26.9%	65	100.0%

Note: These factors are rounded for display purposes.

RETIREMENT OPTIONS

RCW 41.24.172

- The normal payment form of the benefit is a single-life annuity.
- Retirees have the option of selecting a 100 percent joint and survivor pop-up pension. The pension amount is reduced from the amount of the normal payment form to provide an ongoing survivor benefit. If the member dies first, the reduced pension continues to the spouse for their lifetime. If the spouse dies first, the pension pops up to the amount the member would have received under the single-life payment form.

EMERGENCY MEDICAL SERVICE DISTRICTS

- Chapter 331, Laws of 1993 extended the membership provisions of the pension and relief plans to include Emergency Medical Service District (EMSD) volunteers. The applicable RCW states the funding of the EMSD volunteers should be consistent with the most recent actuarial valuation.
- The funding of the system includes contributions from the members and their districts at a rate established in statute. The total of these is less than the normal cost. The balance of the normal cost comes from another revenue source: 40 percent of the state's premium tax on fire insurance policies. Since the premium tax is independent of the number of members, the addition of new members lowers the system's funding. To prevent this, the entire normal cost and administration expenses are paid by the EMSDs and their volunteers. Volunteers pay the fixed dollar rate established in statute. The EMSDs pay the fixed dollar rate plus any excess cost.

RESERVE LAW ENFORCEMENT OFFICERS

- Chapter 11, Laws of 1995 extended the membership provisions of the pension plan to include Reserve Law Enforcement Officers. The pension provisions mirror those of the EMSDs.
- Chapter 148, Laws of 1999 extended the membership provisions of the relief plan to include Reserve Law Enforcement Officers. The relief provisions mirror those of the EMSDs.

REFUND OF CONTRIBUTIONS

Upon termination from the pension system, the member may elect to receive a refund of their contributions without interest. If the member chooses this option, he/she then forfeits any earned pension benefits.

BUYING BACK PAST SERVICE

If a member misses a pension contribution payment in any year following enrollment in the plan, they may make the contribution at a later date. Interest is added at a rate of 1 percent per month.

Relief Benefits

MEDICAL BENEFITS

RCW 41.24.035, 41.24.155, and 41.24.220

The Board will reimburse all duty-related medical charges, including:

- Physician fees, paid according to Labor and Industries' fee schedule.
- Hospital fees (room and care, x-rays, laboratory work, physical therapy).
- Screening physical exams for new entrants (up to $100 per new member).
- Mileage for extended treatment not available locally to VFF members.
- Vocational rehabilitation and prescriptions.

DISABILITY PAYMENTS[4]

RCW 41.24.150

- **Duty Disability —** Members receive temporary duty disability payments of $3,789.26 per month for up to six months. If the member is on disability for six consecutive months then the member is considered to be permanently disabled and they receive $1,894.63 per month, their spouse receives $378.94, and each dependent child receives $163.44. Disability benefits are subject to a maximum of $3,789.26 per month. Spouses are not eligible to receive the beneficiary annuity if they get divorced from the VFF member.
- **Effective July 1, 2001 —** Benefits are increased annually in line with the CPI Urban Wage Earners and Clerical Workers (CPI-W – All Cities).
- **Non-Duty Disability —** None.

DEATH BENEFITS[5]

RCW 41.24.160, 41.24.230

- **Survivors —** Surviving spouses of members who die while on active duty shall be paid $1,894.63 monthly. An additional $530.53 is paid monthly to each of the member's surviving children while they are under 18 years old.
- **Effective July 1, 2001 —** Benefits are increased annually in line with the U.S. CPI-W – All Cities.
- **Duty Death —** A lump sum of $214,000 will be paid to a member's survivor if the member was killed in the line of duty.
- **Funeral and Burial Expenses —** A lump sum of $2,000 is paid for members who die while on active duty. A $500 lump sum is paid at the time of death for members who receive disability benefits.

[4]Disability payments display the amount of payments as of the valuation date of this report.
[5]Death payments display the amount of payments as of the valuation date of this report.

THE OFFICE OF THE STATE ACTUARY'S WEBSITE

Our website (*leg.wa.gov/osa*) contains additional information and educational material not included in this report. The site also contains an archive of 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.

Prior Actuarial Valuation Reports

Archive of valuations over the past several years.

2019 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.

2018 Relief Experience Study

Report documenting the results of an experience study on the assumptions related to relief benefits for the VFF Relief and Pension Fund.

WASHINGTON STATE VOLUNTEER FIRE FIGHTERS' AND RESERVE OFFICERS' RELIEF AND PENSION FUND

2018 ACTUARIAL VALUATION

OCTOBER 2019

Office of the State Actuary

"Supporting financial security for generations."