2015 Actuarial Valuation

WASHINGTON STATE VOLUNTEER FIRE FIGHTERS' AND RESERVE OFFICERS' RELIEF AND PENSION FUND • OCTOBER 2016

Board for Volunteer Fire Fighters and Reserve Officers

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Volunteer Fire Fighters' and Reserve Officers'
Relief and Pension Fund
Actuarial Valuation Report
As of June 30, 2015

October 2016

As required under RCW 41.24.320, this report documents the results of the actuarial valuation the Office of the State Actuary (we) performed on the Volunteer Fire Fighters' and Reserve Officers' 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, 2015, under the funding policy established by the Board for Volunteer Fire Fighters and Reserve Officers. 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 regular address or 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,

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SECTION ONE:

Summary of Key Results

Intended Use

The purpose for performing the Volunteer Fire Fighters' and Reserve Officers' (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 for Volunteer Fire Fighters and Reserve Officers (the Board).
- Measure the pension system's funding progress.
- Compare actual experience with assumptions used.
- Detect significant demographic changes.
- Highlight significant plan, assumption, and method changes.

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.

Per Person Annual Contributions		
Valuation Year	2014	2015
Pension Rate		
Employee	$30	$30
Employer	30	30
State	39	39
Normal Cost Rate	$99	$99
State UAAL Rate	0	0
Total Pension Rate	$99	$99
Relief Rate		
Employer	$30	$30
State	315	282
Total Relief Rate	$345	$312
Operating Expenses		
Administration and Expenses	$35	$32

Members of the pension plan and their employers are charged a set pension rate. Only employers of members are charged a set rate for relief costs. Emergency medical service districts and reserve law enforcement officers' employers pay the full cost of their benefits. Under current funding policy, the state covers all remaining plan costs through the collection of taxes on fire insurance premiums.

The operating expense rate is not actually collected and is provided for informational purposes only. We determined this rate based on actual annual costs from the prior year.

Actuarial Liabilities

Actuarial Liabilities		
(Dollars in Millions)	2014	2015
Present Value of Future Benefits		
Pension Benefits	$189.7	$192.6
Relief Benefits	$24.0	$23.9
Pension Plan*		
Entry Age Normal Accrued Liability	$185.5	$188.5
Unfunded Actuarial Accrued Liability	$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. Relief benefits are not earned or accrued as a member's service increases.*

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 allocated to the relief benefits.

Assets		
(Dollars in Millions)	2014	2015
Market Value of Assets	$204.2	$207.9
Actuarial Value of Assets	189.0	194.5
Contributions*	1.0	1.0
Disbursements	12.8	12.1
Investment Return	33.2	8.8
Other**	$5.7	$5.9
Rate of Return on Assets***	18.7%	4.4%

**Includes Employee, Employer, and Relief contributions.*

***Includes the Fire Insurance Premium Tax less Administrative Expenses.*

****This is the dollar-weighted rate of return on the Market Value of Assets.*

Funded Status

The funded status of the pension plan compares the plan's assets to the earned pension liabilities of its members. We determined this by comparing the Actuarial Value of Assets (AVA) to the EAN accrued pension liabilities calculated using the long-term interest rate assumption.

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. 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 relief funded status is not calculated.

Pension Funded Status		
(Dollars in Millions)	2014	2015
a. Entry Age Normal Accrued Liability	$185.5	$188.5
b. Actuarial Value of Assets Allocated to Pensions	185.5	188.5
c. Unfunded Liability (a-b)	$0.0	$0.0
d. Funded Ratio (b/a)	100%	100%

Note: Totals may not agree due to rounding.

Participant Data

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

Changes in Participant Data			
	2014	2015	Increase
Actives			
Number of Active Members in Relief Plan	12,151	11,831	(3%)
Number of Active Members in Pension Plan	10,093	9,802	(3%)
Percent of Volunteers Covered by Pension Plan	83%	83%	(0%)
Average Age	41.5	41.6	0%
Average Years of Service	10.8	10.8	0%
Inactives			
Number of Retirees/Beneficiaries	4,208	4,296	2%
Number of Terminated Vested Members	6,092	6,197	2%
Number of Survivors (Line of Duty)	11	11	0%
Number of Members with Permanent Disabilities	14	12	(14%)

Actuarial Gain/Loss

The table below 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 the Pension and Relief contribution rates. 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
2014 Contribution Rate	**$98.64**	**$0.00**	**$345.13**
Expected Contribution Rate Change	0.00	0.00	0.00
Liability (Gains) / Losses	11.71	3.05	11.63
Asset (Gains) / Losses	0.00	(3.05)	(14.40)
PV of Future Service (Gains) / Losses	(11.69)	0.00	(30.51)
Incremental Changes (Gains) / Losses	0.12	0.00	0.00
Other (Gains) / Losses	0.00	0.00	0.00
Total Change	**$0.14**	**$0.00**	**($33.28)**
2015 Preliminary Contribution Rate	**$98.78**	**$0.00**	**$311.85**
Laws of 2016	0.00	0.00	0.00
2015 Contribution Rate	**$98.78**	**$0.00**	**$311.85**

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

Significant Changes since the Prior Valuation

The following comments summarize the highlights of changes from the last valuation. Please see the Actuarial Certification Letter for additional comments on the 2015 valuation results.

Since the *2014 Volunteer Fire Fighters' and Reserve Officers' Relief and Pension Fund Actuarial Valuation Report (VAVR)*, the most significant impact to the plan can be attributed to the continued decline in overall active membership counts. An actuarial valuation does not assume new members join the system, however if more members leave the system than expected, it can have a significant impact on the results of the valuation.

The plan also 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.

One of the main economic assumptions is the investment rate of return. The rate of investment return on the actuarial value of assets for the plan year was higher than the assumed rate of 7 percent, which decreased contribution rates.

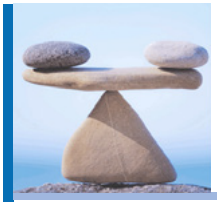
Some key demographic assumptions include termination, retirement, disability, and death rates. The plan experienced both actuarial gains and losses on these demographic assumptions. Liabilities increased less than expected due to higher turnover and fewer active duty-related disablements and deaths, which decreased contribution rates. At the same time, liabilities increased more than expected due to new entrants, which increased contribution rates.

In addition, new entrants into the plan increase the Present Value of Future Service, so the number of years for collecting contributions is larger and this results in an actuarial gain to the system, thus lowering contribution rates.

Detailed gain and loss information by plan can be found in the **Actuarial Exhibits** section of this report.

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, 2015

October 2016

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, 2015, consistent with the Board's adopted funding policy. This report should not be used for other purposes. Please replace this report when a more recent report becomes available.

To produce the valuation results summarized in this report, we performed calculations requiring assumptions about future economic and demographic events. As part of the *2009 Actuarial Valuation Report of the Relief Benefits*, healthcare actuaries from Milliman reviewed the healthcare assumptions and methods we used for the relief plan for reasonableness. We relied on Milliman's expertise for these assumptions and methods since we are not healthcare actuaries. We relied on the medical trend rates based upon the 2015 PEBB OPEB Report. 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 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 adopted the investment rate of return assumption used in this valuation, the amortization policy for the Unfunded Actuarial Accrued Liability (UAAL), and the asset valuation method. We believe the asset valuation method will reduce the UAAL contribution rate volatility produced by the Entry Age Normal (EAN) Actuarial Funding Method when used in combination with the existing asset allocation policy of the Washington State Investment Board (WSIB). The combination of the current asset smoothing method with any other funding method or asset allocation policy may not be appropriate.

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 EAN Actuarial Funding Method.

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Certification Letter
Page 2 of 2

The Board also adopted the policy to pre-fund the relief benefits using the Aggregate Actuarial Funding Method. Unless noted otherwise, we selected all other assumptions and methods used in this valuation.

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. WSIB and the Office of the State Treasurer 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.

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.

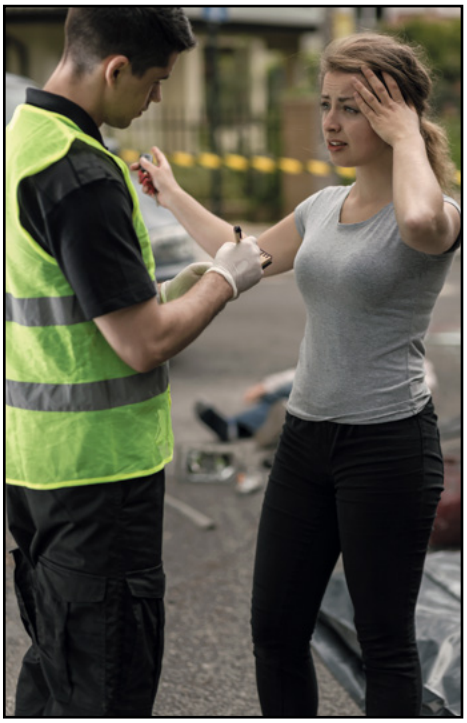
The undersigned, with actuarial credentials, meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. While this report is intended to be complete, we are available to offer extra advice and explanations as needed.

Sincerely,

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

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

Contribution Rates



We used the Entry Age Normal (EAN) Funding Method to determine the pension contribution rates as a level dollar amount. This method divides the contribution rate into two parts: a Normal Cost (NC) rate and a rate to amortize the Unfunded Actuarial Accrued Liability (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.

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 of the Appendices 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.

Pension and Relief Plans Required Annual Contributions		
	Per Person*	Total
Pension Benefits	*(Dollars in Ones)*	*(Dollars in Thousands)*
Entry Age Normal Cost	$98.78	$968
Cost of UAAL	0.00	0
Total Pension Rate	**$98.78**	**$968**
Relief Benefits		
Aggregate Normal Cost	$311.85	$3,690
Total Relief Rate	**$311.85**	**$3,690**
Operating Expenses		
Administration and Expenses**	**$31.91**	**$377**
Total for Pension, Relief, and Expenses	**$442.54**	**$5,035**

**The Per Person rate is based on the number of active members in the data.*

***Estimated using actual dollars.*

Notes: Totals may not agree due to rounding.

Development of Pension Plan Normal Cost*	
(Dollars in Thousands)	**Total**
Future Value of Fully Projected Benefits	$661,624
a. Present Value of Fully Projected Benefits (PVFB)	$192,568
b. Entry Age Normal Actuarial Accrued Liability (AAL)	$188,510
c. Present Value of Future Normal Costs (PVFNC) (a - b)	$4,058
d. Present Value of Future Service (PVFS)**	41,085
e. Per Person Entry Age Normal Cost (c / d in Dollars)	**$99**
f. Number of Active Members in Pension Plan	9,802
g. Entry Age Normal Cost (e x f)	$968

**Please see the Methods section of the Appendix 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	$661,624
a. Present Value of Fully Projected Benefits (PVFB)	$192,568
b. Actuarial Value of Assets (AVA) Allocated to Pensions	$188,510
c. Unfunded PVFB (a - b)	$4,058
d. Present Value of Future Normal Costs (PVFNC)	$4,058
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	9,802
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	$72,128
a. Present Value of Fully Projected Benefits (PVFB)	$23,945
b. Actuarial Value of Assets (AVA)*	$5,966
c. Unfunded PVFB (a - b)	$17,980
d. Present Value of Future Service (PVFS)**	57,654
e. Per Person Aggregate Normal Cost (c / d in Dollars)	**$312**
f. Number of Active Members in Relief Plan	11,831
g. Aggregate Normal Cost (e x f)	$3,690

**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.

Actuarial Liabilities

Present Value of Benefits - Pension Plan*		
(Dollars in Thousands) Liability Measures	EAN AAL**	Fully Projected
Active Members		
Retirement	$41,411	$43,394
Termination	13,906	15,615
Death Benefits	1,052	1,128
Withdrawal	1,719	2,009
Total Actives	**$58,088**	**$62,146**
Inactive Members		
Retirees	$77,489	$77,489
Terminated Vested	46,394	46,394
Survivor	6,538	6,538
Total Inactives	**$130,421**	**$130,421**
2015 Total	**$188,510**	**$192,568**
2014 Total	**$185,510**	**$189,701**

**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	$3,168
Duty-Related Death	3,014
Medical and Temporary Disability	11,968
Total Actives	**$18,150**
Inactive Members	
Survivor	$2,953
Disability	2,842
Total Inactives	**$5,795**
2015 Total	**$23,945**
2014 Total	**$24,004**

**Includes relief benefits only.*

Note: Totals may not agree due to rounding.

Fully Projected Benefit Payments

(Dollars in Thousands)	VFF - Pension Benefits										
Year	Future Value	Present Value	Year	Future Value	Present Value	Year	Future Value	Present Value	Year	Future Value	Present Value
2015	$10,990	$10,625	2040	$13,722	$2,444	2065	$5,250	$172	2090	$382	$2
2016	11,593	10,474	2041	13,402	2,231	2066	4,937	151	2091	312	2
2017	12,053	10,178	2042	13,067	2,033	2067	4,636	133	2092	251	1
2018	12,578	9,926	2043	12,724	1,850	2068	4,345	116	2093	200	1
2019	13,100	9,662	2044	12,352	1,678	2069	4,066	102	2094	157	1
2020	13,569	9,353	2045	11,962	1,519	2070	3,796	89	2095	121	1
2021	13,965	8,996	2046	11,572	1,374	2071	3,537	77	2096	93	0
2022	14,371	8,652	2047	11,232	1,246	2072	3,287	67	2097	70	0
2023	14,732	8,289	2048	10,862	1,126	2073	3,047	58	2098	52	0
2024	15,064	7,921	2049	10,508	1,018	2074	2,817	50	2099	38	0
2025	15,282	7,510	2050	10,134	918	2075	2,595	43	2100	28	0
2026	15,475	7,107	2051	9,767	826	2076	2,383	37	2101	20	0
2027	15,633	6,710	2052	9,421	745	2077	2,181	32	2102	14	0
2028	15,713	6,304	2053	9,091	672	2078	1,987	27	2103	10	0
2029	15,755	5,907	2054	8,777	606	2079	1,802	23	2104	7	0
2030	15,742	5,516	2055	8,457	546	2080	1,626	19	2105	5	0
2031	15,659	5,128	2056	8,138	491	2081	1,460	16	2106	3	0
2032	15,538	4,755	2057	7,843	442	2082	1,302	14	2107	2	0
2033	15,401	4,405	2058	7,540	397	2083	1,153	11	2108	1	0
2034	15,254	4,078	2059	7,226	356	2084	1,014	9	2109	1	0
2035	15,068	3,764	2060	6,919	318	2085	884	7	2110	1	0
2036	14,845	3,466	2061	6,586	283	2086	764	6	2111	0	0
2037	14,590	3,184	2062	6,251	251	2087	653	5	2112	0	0
2038	14,298	2,916	2063	5,911	222	2088	553	4	2113	0	0
2039	$14,010	$2,670	2064	$5,575	$196	2089	$462	$3	2114	$0	$0
									Total	$661,624	$192,568

Fully Projected Benefit Payments

(Dollars in Thousands)	VFF - Relief Benefits										
Year	Future Value	Present Value	Year	Future Value	Present Value	Year	Future Value	Present Value	Year	Future Value	Present Value
2015	$2,019	$1,952	2040	$1,265	$225	2065	$480	$16	2090	$141	$1
2016	2,001	1,808	2041	1,236	206	2066	460	14	2091	126	1
2017	1,982	1,674	2042	1,207	188	2067	439	13	2092	112	1
2018	1,961	1,548	2043	1,177	171	2068	419	11	2093	99	0
2019	1,940	1,430	2044	1,145	156	2069	400	10	2094	86	0
2020	1,917	1,322	2045	1,111	141	2070	382	9	2095	73	0
2021	1,895	1,220	2046	1,076	128	2071	365	8	2096	62	0
2022	1,871	1,126	2047	1,038	115	2072	350	7	2097	52	0
2023	1,846	1,039	2048	998	104	2073	336	6	2098	42	0
2024	1,820	957	2049	957	93	2074	324	6	2099	34	0
2025	1,790	880	2050	915	83	2075	313	5	2100	27	0
2026	1,756	807	2051	872	74	2076	302	5	2101	22	0
2027	1,721	739	2052	831	66	2077	293	4	2102	17	0
2028	1,684	676	2053	790	58	2078	283	4	2103	13	0
2029	1,646	617	2054	752	52	2079	274	3	2104	9	0
2030	1,607	563	2055	716	46	2080	264	3	2105	7	0
2031	1,568	514	2056	684	41	2081	254	3	2106	5	0
2032	1,529	468	2057	655	37	2082	244	3	2107	3	0
2033	1,491	427	2058	628	33	2083	233	2	2108	2	0
2034	1,455	389	2059	604	30	2084	221	2	2109	1	0
2035	1,420	355	2060	582	27	2085	209	2	2110	1	0
2036	1,386	324	2061	561	24	2086	196	2	2111	1	0
2037	1,354	296	2062	541	22	2087	183	1	2112	0	0
2038	1,324	270	2063	521	20	2088	169	1	2113	0	0
2039	$1,294	$247	2064	$500	$18	2089	$155	$1	2114	$0	$0
									Total	$72,128	$23,945

Assets

Change in Market Value of Assets	
(Dollars in Thousands)	
Market Value as of June 30, 2014	**$204,195**
Revenue	
Member Pension Contributions	$76
Employer Pension Contributions	454
Relief Plan Contributions	459
Investment Earnings Net of Expenses	8,849
Net Fire Insurance Premium Tax*	5,903
Total Revenue	**$15,740**
Disbursements	
Refunds	$33
Expenses	2
Disability and Survivor Benefits	560
Miscellaneous	0
Medical Benefits	1,018
Retirement Pensions (monthly and lump sums)	10,468
Total Disbursements	**$12,080**
Market Value as of June 30, 2015	**$207,855**

**BVFF allocated $1100K to their admin account. Actual admin costs for the prior year were approximately $377K.*

Note: Totals may not agree due to rounding.

Calculation of the Actuarial Value of Assets			
Assets as of June 30, 2014			
(Dollars in Thousands)			
a. Market Value of Assets			$204,195
b. Deferred Investment Gains (Losses)			15,234
c. Actuarial Value of Assets (a-b)			$188,961
d. Ratio of Actuarial Value to Market Value (c/a)			93%
Assets as of June 30, 2015			
(Dollars in Thousands)			
a. Market Value at 6/30/2015			**$207,855**
b. Deferred Gains and (Losses)			
Plan Year Ending	Years Deferred	Years Remaining	
6/30/2015	3	2	(3,417)
6/30/2014	8	6	15,021
6/30/2013	5	2	3,138
6/30/2012	6	2	(2,879)
6/30/2011	8	3	6,371
6/30/2010	4	0	0
6/30/2009	8	1	(4,855)
Total Deferral			$13,380
c. Market Value less Deferral (a - b)			**$194,475**
d. 70% of Market Value of Assets			$145,499
e. 130% of Market Value of Assets			$270,212
f. Actuarial Value of Assets*			**$194,475**
g. Ratio of Actuarial Value to Market Value (f/a)			**94%**

**The actuarial value of assets may not exceed 130% nor drop below 70% of the market value of assets.*

Note: Totals may not agree due to rounding.

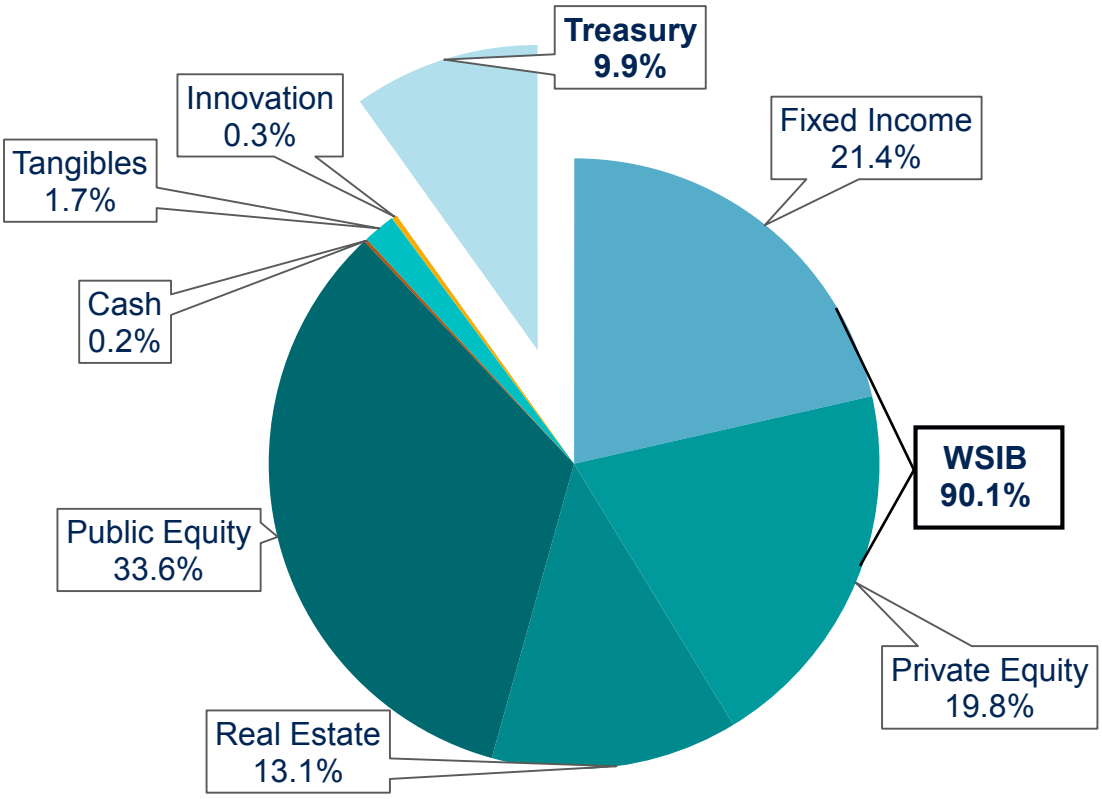
The Board for Volunteer Fire Fighters and Reserve Officers (the Board) established the plan's asset fund to pay for both pension and relief benefits. They chose to allocate the assets to pensions up to the Actuarial Accrued Liability (AAL) for the pension plan with any remaining assets allocated to relief benefits. The table below summarizes the allocation of the assets to the pension and relief plans.

Allocation of Assets by Plan			
(Dollars in Millions)	Pension	Relief	Total
Actuarial Value of Assets	$188.5	$6.0	$194.5

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 Treasury and the Washington State Investment Board (WSIB) accounts. On a long-term basis, we expect the Treasury investments to

earn 4.0 percent per year and the WSIB investments to earn 7.5 percent per year net of expenses. The distribution of total plan assets between each account fluctuates by year and is monitored by the Board to ensure adequate assets in the Treasury account to make benefit payments. The graph below shows details of the asset allocation for the plan.

Asset Allocation as of June 30, 2015



The VFF asset allocation as of the valuation date includes assets in the WSIB CTF, which comprise a vast majority of the VFF assets. The remaining VFF assets are held in the Treasury and are invested in short-term bonds.

Annual Income vs. Costs	
(Dollars in Thousands)	
Pension and Relief Plans	Total
Actuarial Costs	
Entry Age Normal Cost	$968
UAAL (Surplus)	$0
Total Pension	$968
Relief Aggregate Normal Cost	$3,690
Total Actuarial Costs	**$4,658**
Income	
State	
Fire Insurance Premium Tax	$7,003
Allocation to Administrative Fund	($1,100)
Total State	**$5,903**
Pension	
Employee	$288
Employer	$288
Other Pension*	$21
Total Pension	**$596**
Relief	
Employer**	$347
Other Relief*	$87
Total Relief	**$433**
Total Income	**$6,932**
Surplus (Deficit) Income	**$2,274**

**Emergency Medical Services Districts and Reserve Law Enforcement Officers pay the full cost of their benefits.*

***Relief fees based on the rate of $30.00 per member.*

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 Actuarial Value of Assets (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 Market Value of Assets (MVA) by deferring a portion of annual investment gains or losses for a certain number of years.

Investment gains and losses occur when the annual return on investments varies from the long-term assumed rate of 7 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 Present Value of Future Benefits and the pension's Present Value of Future Normal Cost. 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.

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.

We do not calculate an actuarial accrued liability 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 is not calculated. 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.

Pension Funded Status on Actuarial Value Basis			
(Dollars in Thousands)			
Entry Age Normal Accrued Liability[1]	**$188,510**		
Actuarial Value of Assets[2]	**188,510**		
Unfunded Liability	**$0**		
Funded Ratio			
June 30, 2015[2,4]	**100%**	December 31, 2001[4]	142%
June 30, 2014[2,4]	100%	December 31, 2000[4]	144%
June 30, 2013[2,4]	99%	December 31, 1999	132%
June 30, 2012[2]	100%	December 31, 1998[3]	120%
June 30, 2011[2]	100%	December 31, 1997	144%
June 30, 2010[2]	100%	December 31, 1996	129%
June 30, 2009[3]	102%	December 31, 1995[4]	118%
June 30, 2008	105%	December 31, 1994	112%
June 30, 2007[4]	107%	December 31, 1993[4]	114%
December 31, 2006	103%	December 31, 1992	108%
December 31, 2005[4]	95%	December 31, 1991[3]	103%
December 31, 2004	113%	December 31, 1990	111%
December 31, 2003	116%	December 31, 1989[4]	112%
December 31, 2002[3]	122%	December 31, 1988	98%

[1] *Prior to 2007 we used the Projected Unit Credit Liability to calculate the funded status.*

[2] *Excess assets above Pension AAL are allocated to Relief Benefits.*

[3] *Benefits increased.*

[4] *Actuarial assumptions changed.*

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 table below 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	$205,805	$188,510	$173,577
Actuarial Value of Assets[1]	194,475	188,510	173,577
Unfunded Liability	$11,330	$0	$0
Funded Ratio			
June 30, 2015[1,3]	94%	100%	100%
June 30, 2014[1,3]	93%	100%	100%
June 30, 2013[1,3]	91%	99%	100%
June 30, 2012[1]	96%	100%	100%
June 30, 2011[1]	95%	100%	100%
June 30, 2010[1]	93%	100%	100%
June 30, 2009[2]	93%	102%	111%
June 30, 2008	96%	105%	115%
June 30, 2007[3]	98%	107%	117%

[1] *Excess assets above Pension AAL are allocated to Relief Benefits.*

[2] *Benefits increased.*

[3] *Actuarial assumptions changed.*

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 investment returns at a rate of 7 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. 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. The dollar-weighted annual rate of return was 4.4 percent on the MVA for the year ending June 30, 2015 (the valuation date).

- **Premium Tax** — As the state's contribution to the plan, the Office of the State Treasurer allocates 40 percent of the premium tax paid on fire insurance policies to fund the plan. 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.

Premium Taxes Contributed to Plan			
Year	(Dollars in Thousands)		
2015	$5,903		
2014	$6,383	2001	$3,320
2013	$5,958	2000	$2,869
2012	$5,602	1999	$2,706
2011	$5,815	1998	$2,285
2010	$5,685	1997	$2,539
2009	$5,794	1996	$2,973
2008	$5,853	1995	$2,330
2007	$5,689	1994	$2,370
2006	$5,186	1993	$2,016
2005	$4,808	1992	$1,736
2004	$4,726	1991	$2,081
2003	$4,112	1990	$1,892
2002	$3,605	1989	$1,900

Demographic Experience

Actual vs. Expected Demographic Counts			
Counts by Decrement Type	Actual	Expected	Act/Exp
New Entrants	1,611	N/A	0.00
Retirements	66	203.8	0.32
Terminations	1,510	1,219.3	1.24
Active Deaths	6	22.9	0.26
Active Disabilities	0	1.2	0.00
Inactive Deaths*	114	260.3	0.44

**Excludes terminated and vested records that cashout or become missing records.*

Actuarial Gain/Loss

Since the 2014 VAVR, the key gains and losses that impacted the results of this valuation include the following.

- The pension and relief normal cost rates experienced losses, which increased contribution rates. Primarily, these losses are attributable to new members joining the plan which increased pension liabilities and expected medical costs.
- The pension UAAL rate experienced both gains and losses. Primarily, the gains are attributable to more active members terminating than expected. Comparatively, the losses are attributable to new members joining the pension plan and members returning to active volunteer service.

- The annual investment rate of return on the MVA was 4.4 percent in 2015, however, the AVA increased by more than the 7 percent we expected. This results in an asset gain for the plan which decreased the pension UAAL contribution rate.
- The AVA continues to exceed the accrued pension liability so the pension UAAL remains at zero. Any AVA amount that exceeds the accrued pension liability is included in the calculation of the relief contribution rate.
- New members joining the plan also increase the Present Value of Future Service (PVFS). As a result, this gain caused the pension and relief normal cost rates to decrease.

Change in Pension Normal Cost Rate by Source*	
2014 Pension Normal Cost Rate	**$98.64**
Liabilities	
Termination	($5.33)
Retirement	0.41
Mortality	0.22
Growth / Return to Work	14.95
Other Liabilities	1.46
Total Liabilities (Gains) / Losses	**$11.71**
PV of Future Service (Gains) / Losses	**($11.69)**
Incremental Changes	
Plan Changes	0.00
Method Changes	0.00
Assumption Changes	0.12
Correction Changes	0.00
Total Incremental Changes (Gains) / Losses	**$0.12**
Other (Gains) / Losses	**$0.00**
Total Change	**$0.14**
2015 Preliminary Pension Normal Cost Rate	**$98.78**
Laws of 2016	0.00
2015 Pension Normal Cost Rate	**$98.78**

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

Change in Pension UAAL Rate by Source	
2014 Pension UAAL Rate	**$0.00**
Expected UAAL Rate Change	**$0.00**
Liabilities	
Termination	($7.60)
Retirement	(1.93)
Mortality	5.17
Growth / Return to Work	9.37
Other Liabilities	(1.96)
Total Liabilities (Gains) / Losses	**$3.05**
Assets	
Investment Return	($13.42)
Allocation of Excess Pension Assets*	10.37
Total Assets (Gains) / Losses	**($3.05)**
Incremental Changes	
Plan Changes	$0.00
Method Changes	0.00
Assumption Changes	0.00
Data Changes	0.00
Total Incremental Changes (Gains) / Losses	**$0.00**
Other (Gains) / Losses	**$0.00**
Total Change	**$0.00**
2015 Preliminary Pension UAAL Rate	**$0.00**
Laws of 2016	0.00
2015 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	
2014 Relief Normal Cost Rate	**$345.13**
Liabilities	
Termination	($7.34)
Retirement	0.04
Disability	(9.72)
Mortality	(15.48)
Growth / Return to Work	18.22
Other Non-Medical	4.45
Medical	20.21
Other Liabilities	1.25
Total Liabilities (Gains) / Losses	**$11.63**
Assets	
Investment Return	($0.56)
Allocation of Excess Pension Assets*	(13.84)
Total Assets (Gains) / Losses	**($14.40)**
PV of Future Service (Gains) / Losses	**($30.51)**
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**
Other (Gains) / Losses	**$0.00**
Total Change	**($33.28)**
2015 Preliminary Relief Normal Cost Rate	**$311.85**
Laws of 2016	0.00
2015 Relief Normal Cost Rate	**$311.85**

**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, Assumption, and Method Changes

Plan Changes

- **None.**

Assumption Changes

- **Administrative Factors** — As part of the changes from the recent demographic experience studies, we updated the administrative factors used by the Board. Any corresponding factor used in our valuation software was also updated including new actuarially equivalent early retirement reduction factors and a new average joint and survivor reduction factor. These changes only impacted benefits for active and terminated vested members who die prior to collecting their first pension payment.

Method Changes

- **None.**

Per Person Annual Contribution Rates				
Valuation Year	2014 Final	Data & Asset Changes*	Incremental Changes**	2015 Final
Pension Rate				
Employee	$30	$0	$0	$30
Employer	30	0	0	30
State	39	0	0	39
Normal Cost Rate	$99	$0	$0	$99
State UAAL or (Surplus) Rate	0	0	0	0
Total Pension Rate	$99	$0	$0	$99
Relief Rate				
Employer	$30	$0	$0	$30
State	315	(35)	2	282
Total Relief Rate	$345	($35)	$2	$312

**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 plan, assumption, and method changes.*

SECTION THREE:

Participant Data

Membership Data					
Actives	**2011**	**2012**	**2013**	**2014**	**2015**
Number of Members in Relief System	12,982	12,631	12,290	12,151	11,831
Average Age	40.1	40.2	40.6	40.4	40.7
Average Total Service	8.5	8.7	9.8	9.6	9.7
Number of Emergency Medical Technicians	67	57	64	73	62
Number of Reserve Law Enforcement Officer	257	238	228	227	216
Number of Active Members Also Receiving a Pension	19	37	86	54	82
Number of Members in Pension System	10,562	10,432	10,230	10,093	9,802
Percent of Volunteers Covered	81%	83%	83%	83%	83%
Average Age	41.5	41.5	41.6	41.5	41.6
Average Total Service	9.9	9.9	10.8	10.8	10.8
Average Pension Benefit Service	8.9	8.9	8.9	8.9	8.9
Number of Emergency Medical Technicians	36	31	35	35	28
Number of Reserve Law Enforcement Officer	232	210	203	198	185
Retirees					
Number of Retirees/Beneficiaries	3,836	3,971	4,117	4,208	4,296
Average Age	74.2	74.3	74.4	74.6	75.0
Number of New Retirees	207	237	214	220	180
Average Annual Benefit	$2,188	$2,198	$2,201	$2,217	$2,232
Total Annual Benefit Payments	$8,392,458	$8,729,864	$9,062,937	$9,330,521	$9,586,607
Terminated Vested					
Number of Terminated Vested	6,142	6,174	6,123	6,092	6,197
Relief Annuities					
Number of Duty-Death Survivors	14	14	14	11	11
Average Age	73.1	74.1	75.2	71.6	69.2
Average Annual Benefit	$19,853	$20,264	$20,984	$21,425	$21,718
Number of Duty-Related Disabled	13	13	13	14	12
Average Age	65.2	66.2	67.2	67.6	67.0
Average Annual Benefit	$22,300	$22,762	$23,571	$24,184	$24,256

Pension 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	478	198	147	84	69	38	37	24	34	1,109
2	365	171	144	95	78	42	35	26	34	990
3-4	379	287	201	153	125	112	75	63	72	1,467
5-9	189	422	335	335	255	224	153	144	182	2,239
10-14	0	89	222	208	205	170	190	135	159	1,378
15-19	0	0	53	147	130	140	144	123	153	890
20-24	0	0	0	36	107	154	137	134	167	735
25 +	0	0	0	0	13	80	194	305	402	994
Total	1,411	1,167	1,102	1,058	982	960	965	954	1,203	9,802

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	959	356	274	169	120	79	64	46	74	2,141
2	479	222	193	125	95	55	49	39	46	1,303
3-4	453	344	238	168	137	126	85	71	101	1,723
5-9	205	460	366	355	272	237	167	167	253	2,482
10-14	0	92	233	215	211	173	197	142	188	1,451
15-19	0	0	53	148	131	140	145	126	161	904
20-24	0	0	0	36	107	154	137	139	176	749
25 +	0	0	0	0	13	80	196	308	481	1,078
Total	2,096	1,474	1,357	1,216	1,086	1,044	1,040	1,038	1,480	11,831

Pension Retirees*					
Age	Number of Retirees	Average Annual Benefit	Age	Number of Retirees	Average Annual Benefit
60	14	$1,419	76	181	$2,248
61	8	$1,141	77	181	$1,991
62	26	$1,700	78	180	$2,117
63	42	$1,968	79	152	$2,110
64	63	$2,069	80	148	$2,093
65	141	$2,199	81	129	$2,222
66	187	$2,397	82	111	$2,320
67	203	$2,318	83	112	$2,141
68	254	$2,323	84	87	$2,225
69	237	$2,317	85	108	$2,249
70	230	$2,369	86	89	$2,242
71	210	$2,275	87	81	$2,190
72	229	$2,303	88	69	$2,333
73	224	$2,262	89	57	$2,212
74	204	$2,306	90 +	168	$2,225
75	171	$2,171	Total	4,296	$2,232

**Includes beneficiaries of service retirees.*

Line-of-Duty Death Survivors		
Age	Number of Survivors	Average Annual Benefit
<60	3	$21,718
60-74	2	21,718
75-89	4	21,718
90+	2	$21,718
Total	11	$21,718

Retirees with Disabilities		
Age	Number of Retirees	Average Annual Benefit
<60	2	$23,893
60-74	7	24,204
75-89	3	24,618
90+	0	$0
Total	12	$24,256

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 2009 relief valuation. We assume duty related disability rates increase with age. The older the Volunteer Fire Fighter (VFF) relief member is, the higher the probability of duty-related disability.
- **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 Disability*	
Age	Rate
19	0.000%
20	0.008%
25	0.009%
30	0.010%
35	0.011%
40	0.012%
45	0.013%
50	0.014%
55	0.015%
60	0.016%
65	0.017%
70	0.018%
75	0.019%
79	0.020%
80	0.000%

**The rates are linearly interpolated between the ages.*

Probability of Retirement*		
	Rate	
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.*

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.*

- **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. The Society of Actuaries published both the RP-2000 and Scale BB tables. Please see osa.leg.wa.gov for the actuarial valuation report for more details on the development of these tables.

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.*

For display purposes only, we show a unisex mortality table below based upon the percent male assumption described later in this section and applied it to the active and retired member population. We use the opposite percent male assumption when applying the mortality table to surviving spouses.

Mortality Rates Projected to 2030															
Age	Member	Survivor	Disabled	Age	Member	Survivor	Disabled	Age	Member	Survivor	Disabled	Age	Member	Survivor	Disabled
19	0.000301	0.000189	0.019360	42	0.001010	0.000741	0.019360	65	0.007668	0.006185	0.034203	88	0.089393	0.069547	0.109924
20	0.000301	0.000189	0.019360	43	0.001077	0.000812	0.019360	66	0.008418	0.006942	0.034687	89	0.101822	0.077714	0.117963
21	0.000301	0.000189	0.019360	44	0.001154	0.000889	0.019360	67	0.009258	0.007807	0.035255	90	0.116033	0.088898	0.131379
22	0.000311	0.000190	0.019360	45	0.001243	0.000974	0.019360	68	0.010040	0.008642	0.035916	91	0.131841	0.101231	0.146991
23	0.000318	0.000193	0.019360	46	0.001343	0.001062	0.020483	69	0.011156	0.009560	0.037660	92	0.148107	0.114459	0.163763
24	0.000325	0.000196	0.019360	47	0.001441	0.001154	0.021611	70	0.012359	0.010569	0.039574	93	0.165587	0.128503	0.181552
25	0.000328	0.000200	0.019360	48	0.001548	0.001249	0.022745	71	0.013865	0.011901	0.041673	94	0.184142	0.143170	0.200354
26	0.000329	0.000205	0.019360	49	0.001661	0.001349	0.023885	72	0.015345	0.013202	0.043967	95	0.203615	0.158272	0.219844
27	0.000330	0.000211	0.019360	50	0.001782	0.001457	0.025034	73	0.017041	0.014681	0.046467	96	0.223866	0.173631	0.239904
28	0.000335	0.000219	0.019360	51	0.001912	0.001574	0.026190	74	0.018978	0.016323	0.049177	97	0.244778	0.189074	0.260458
29	0.000345	0.000229	0.019360	52	0.002183	0.001747	0.027351	75	0.021160	0.018105	0.052101	98	0.258378	0.198358	0.273660
30	0.000361	0.000242	0.019360	53	0.002378	0.001903	0.028517	76	0.023594	0.020014	0.055232	99	0.279772	0.212992	0.294479
31	0.000390	0.000258	0.019360	54	0.002594	0.002028	0.029642	77	0.026273	0.022081	0.058565	100	0.292716	0.220473	0.306911
32	0.000439	0.000299	0.019360	55	0.002838	0.002170	0.030762	78	0.029201	0.024349	0.062087	101	0.314386	0.233710	0.328319
33	0.000495	0.000339	0.019360	56	0.003208	0.002372	0.031878	79	0.032427	0.026867	0.065781	102	0.327007	0.241278	0.340343
34	0.000555	0.000382	0.019360	57	0.003602	0.002625	0.032122	80	0.036019	0.029687	0.069628	103	0.349323	0.258345	0.361082
35	0.000617	0.000422	0.019360	58	0.003908	0.002864	0.032339	81	0.040007	0.032835	0.073610	104	0.360360	0.269531	0.370191
36	0.000679	0.000461	0.019360	59	0.004261	0.003132	0.032537	82	0.044736	0.036394	0.077712	105	0.380708	0.290350	0.387409
37	0.000739	0.000500	0.019360	60	0.004662	0.003438	0.032730	83	0.049950	0.040386	0.081918	106	0.387409	0.303593	0.390781
38	0.000794	0.000538	0.019360	61	0.005135	0.003795	0.032929	84	0.055662	0.044864	0.086221	107	0.390781	0.317030	0.392273
39	0.000848	0.000580	0.019360	62	0.005672	0.004228	0.033146	85	0.061904	0.049896	0.090616	108	0.392273	0.330453	0.393744
40	0.000899	0.000626	0.019360	63	0.006294	0.004818	0.033446	86	0.068734	0.055562	0.095099	109	0.393744	0.343697	0.395154
41	0.000952	0.000679	0.019360	64	0.006999	0.005510	0.033794	87	0.078413	0.062162	0.102309	110	1.000000	1.000000	1.000000

Note: The projection year selected above is 15 years past the valuation date. This year was selected as a reasonble proxy for all members on average and is intended for illustrative purposes only. The valuation uses generational mortality rates as opposed to to a static projection year. These mortality rates were blended for display purposes using the 90% Male assumption. Utilizes PERS age offset assumption of -1 Male, -1 Female.

Pension Benefit Assumptions

- **Purchase of Membership Service Credit** — We assume all eligible members will purchase service credits 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 above. These assumptions are consistent with those selected for PERS 2.

Ratio of Survivors Taking Annuities	
Age	Rate
39	0.000%
40	2.106%
45	13.847%
50	25.656%
55	37.464%
60	49.273%
62+	57.296%

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

- **Joint and Survivor Reduction Factor** — We assume a reduction factor of 0.836 will be applied to joint and survivor pension 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

The following assumptions were developed in the *2009 Actuarial Valuation of the Relief Benefits*, the 2015 Economic Experience Study, and the 2007-2012 Demographic Experience Study for the plans administered by the Department of Retirement Systems.

- **Annual Cost-of-Living Adjustment (COLA)** — We assume a 2.75 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.
- **Duty-Related Death Rate** — We assume the VFF duty-related death rate is 1/12,000 = 0.0083 percent. The duty-related death rate is a constant probability, regardless of age.

- **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 64.2 percent of the active population is married, consistent with the Law Enforcement Officers' and Fire Fighters' (LEOFF) Plan 2. 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.
- **Number of Dependent Children** — We assume 0.61 constant over all ages of VFF relief members.
- **Duration of Child Annuity** — We assume the average age of a child receiving a VFF relief annuity is eight years old. As a result, we assume that the child based annuities will be paid for ten years.
- **Annual Medical Inflation** — To estimate future medical costs, we chose to apply the medical inflation assumptions from our 2015 Other Post-Employment Benefits Actuarial Valuation Report. Based upon the self-insured nature of the VFF relief plan, we assumed the medical inflation trend is consistent with the 2015 Uniform Medical Plan Non-Medicare rates excluding the provision for excise taxes since we assume they do not apply to this plan.

Medical Inflation

Valuation Year	Rate
2015	4.5%
2016	3.7%
2017	4.6%
2018 - 2019	5.5%
2020 - 2021	5.6%
2022 - 2023	5.7%
2024 - 2030	5.8%
2031 - 2036	5.9%
2037	5.8%
2038 - 2039	5.7%
2040 - 2045	5.6%
2046 - 2060	5.5%
2061 - 2062	5.4%
2063	5.3%
2064	5.2%
2065 - 2066	5.1%
2067	5.0%
2068 - 2069	4.9%
2070	4.8%
2071+	4.7%

Miscellaneous Assumptions

- **Valuation Interest Rate** — We assumed an annual investment rate of return of 7 percent.
- **Percent Male** — We assume 90 percent male for the entire population consistent with LEOFF 2. We only use this assumption when the gender of a spouse is unknown. Otherwise, we use the gender as reported by the Board for Volunteer Fire Fighters (the Board).

Actuarial Methods

Asset Valuation Method

An asset valuation method is generally used to adjust the market value of assets and smooth the effects of short-term volatility. The adjusted assets are called the Actuarial Value of Assets (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.

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 actuarial value of assets may not exceed 130% nor drop below 70% of the market value of assets.

We determine the AVA by adjusting the Market Value of Assets (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 Present Value of Future Benefits (PVFB) over the Present Value of Future Normal Costs (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.

Methods for Medical Benefits

Duty-related medical benefits, temporary disability payments, and physical exams are valued using age-based premiums. The estimated "payments" for temporary disability and physical exams are assumed to increase by the 2.75 percent inflation assumption. The medical benefits are assumed to increase by medical inflation. The per-person cost, as of the valuation date, for each benefit is $129.62 for medical, $14.47 for temporary disability, and $10.52 for physicals. These costs include an adjustment from a mid-year timing to a beginning of year timing to properly model the premium payment within the technical limitation of our valuation software.

Operating Expenses

We used the actual administration and other miscellaneous expenses incurred last year to determine this year's operating expenses.

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 2015 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 2016 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 2016 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 table below.
- 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

RCW 41.24.150

- **Duty Disability** — Members receive temporary duty disability payments of $3,674.10 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 $1,837.05 per month, their spouse receives $367.96, and each dependent child receives $158.49. Disability benefits are subject to a maximum of $3,674.10 per month. Spouses will no longer be 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

RCW 41.24.160, 41.24.230

- **Survivors** — Surviving spouses of members who die while on active duty shall be paid $1,837.05 monthly. An additional $514.46 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.

Glossary

You can also use the OSA online Glossary.

Actuarial Accrued Liability (AAL)

Computed differently under different funding methods, the AAL generally represents the portion of the Present Value of Fully Projected Benefits attributable to service credit earned (or accrued) as of the valuation date.

Actuarial Gain or Loss

A pension plan incurs actuarial gains or losses when the actual experience of the pension plan does not exactly match assumptions. For example, an actuarial gain would occur if assets earned 10 percent for a given year since the assumed interest rate in the valuation is 7 percent.

Actuarial Value of Assets (AVA)

The value of pension plan investments and other property used by the actuary for the purpose of an actuarial valuation (sometimes referred to as valuation assets). Actuaries often select an asset valuation method that smooths the effects of short-term volatility in the market value of assets.

Dollar-Weighted Rate of Return

The internal rate of return. This signifies the rate of return during a period with respect to the beginning balance and cash flows that occur during the period. Dollar-Weighted returns measure the actual impact the pension plan experiences during the period, which includes returns based on the timing of the cash flows during the period.

Entry Age Normal (EAN) Funding Method

The EAN Funding Method is a standard actuarial funding method. The annual cost of benefits under EAN is comprised of two components:

Normal Cost, plus Amortization of the Unfunded Actuarial Accrued Liability.

The normal cost is determined on an individual basis, from a member's age at plan entry, and is designed to be a level percentage of pay throughout a member's career if all assumptions are realized and benefit provisions remain unchanged.

Funded Status

The ratio of a plan's actuarial value of assets to the present value of earned pensions at the valuation date.

Normal Cost

Computed differently under different funding methods, the normal cost generally represents the portion of the cost of projected benefits allocated to the current plan year. The employer normal cost is the total normal cost of the plan reduced by employee contributions.

Present Value of Future Benefits (PVFB)

Computed by projecting the total future benefit cash flow from the plan, using actuarial assumptions (such as the probability of death or retirement), and then discounting the cash flow to the valuation date using the valuation interest rate.

Time-Weighted Rate of Return

The geometric average rate of return. This signifies the rate of return during a period without respect to cash flows that occur during the period. Investment manager performance is typically based on time-weighted returns since they have no control over when the cash flows occur.

Unfunded Actuarial Accrued Liability (UAAL)

The excess, if any, of the actuarial accrued liability over the actuarial value of assets. In other words, the present value of benefits earned to date not covered by current plan assets.

2015 Actuarial Valuation

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