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April 14, 2020

Ms. Cynthia Wilkinson
Policy, Planning and Compliance Director
Virginia Retirement System
1200 E. Main Street
Richmond, VA 23219

Dear Ms. Wilkinson:

Enclosed are 13 original bound copies of the "Report on the Actuarial Valuation of the Line of Duty Act Fund Prepared as of June 30, 2019."

Please let us know if you have any questions concerning the report.

Sincerely yours,

Alisa Bennett, FSA, EA, FCA, MAAA
President

Larry Langer, ASA, EA, FCA, MAAA
Principal and Consulting Actuary

Bradley R. Wild, ASA, FCA, MAAA
Senior Actuary

AB/LL/BRW:w1

Enclosure



Cavanaugh Macdonald
CONSULTING, LLC

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**Virginia
Retirement
System**

**Report on the Actuarial Valuation of the
Line of Duty Act Fund**

Prepared as of June 30, 2019





Cavanaugh Macdonald

CONSULTING, LLC

The experience and dedication you deserve

April 14, 2020

The Board of Trustees
Virginia Retirement System
1200 E. Main Street
Richmond, VA 23219

Dear Trustees:

We are pleased to submit the results of the annual actuarial valuation of the Virginia Retirement System (VRS) Line of Duty Act Fund (Plan) prepared as of June 30, 2019.

The purpose of this report is to recommend rates of contribution on a Pay-As-You-Go funding basis and also to calculate an Actuarially Determined Employer Contribution Rate (ADEC) to be used for GASB 74 purposes.

Cavanaugh Macdonald Consulting, LLC (CMC) has relied on the plan provisions and eligibility provisions of the Commonwealth of Virginia's Line of Duty Program (LODA Program) provided by §9.1-400 et seq. of the Virginia Code (Code), including changes resulting from the passage of House Bill 1345 (HB 1345) from the 2016 legislative session, Item 269 of the 2016 Appropriations Act (the Act) and House Bill 2243 (HB 2243) from the 2017 legislative session. Additionally, CMC has received participant data from the Virginia Retirement System (VRS). CMC has reviewed the data for reasonableness only and has not performed a formal audit of the data used for this valuation. While the inactive census data is complete, because the active census data was collected from a wide range of sources with varying and, at times, limited content, the data is incomplete. Adjustments have been made to account for this incompleteness by filling in missing information using averages from other active groups where the information is known. Along with the valuation results, commentary is provided regarding the various aspects of developing the cost structure for LODA Program benefits to be financed through the Plan.

The valuation results are provided on a blended, single group cost basis. Health care benefits are uniform amongst Plan beneficiaries due to the passage of HB 1345 (2016) and HB 2243 (2017). The legislation revised the Line of Duty Act by transferring overall administration of eligibility determinations to VRS and administration of health insurance benefits to the Department of Human Resource Management (DHRM) and creates state-wide health insurance plans for all LODA beneficiaries, with separate plans based on Medicare eligibility. The legislation became effective July 1, 2017 and is included in this valuation. The assumed health care costs are based upon the premium amounts provided by the DHRM actuaries which used experience of those State Employees currently receiving health care benefits from the Plan.

Contribution rates for participating employer groups are established every two years. Based upon the June 30, 2017 valuation results, the Board approved rate for fiscal years 2019 and 2020 is \$705.77. The Board approved rate of \$695.18 for fiscal years 2021 and 2022 is based upon the most recent valuation June 30, 2019. The results of the June 30, 2018 valuation are for informational purposes only. The June 30, 2019 contribution rates assume Plan participation of 11,561.10 State Employee FTEs and 7,682.25 Political Subdivision Employee FTEs, for a total of 19,243.35 FTEs.

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The Board of Trustees
April 14, 2020
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The results provided do not account for the potential long-term incurred but not reported claims resulting from a lack of employer or beneficiary education about the Plan's benefits. The potential cost and liability for these claims may be considerable. A margin for these costs may need to be considered as experience develops.

The promised death benefits and postemployment health care benefits provided through the Plan are included in all of the actuarially estimated contribution rates. The Plan is a cost-sharing, multiple-employer plan. The actuarially determined employer contribution rates were developed using the entry age normal cost method with projected benefits. As the Act requires contributions to be determined on a current disbursement basis, the Plan has minimal assets in trust solely to provide benefits. Therefore, the valuation results provided in this report reflect a discount rate of 4.75%. The assumed annual rate of return of 4.75% represents a blend between the long term rate of 6.75% to the extent the fund has assets and a short term bond rate once the assets have been depleted. As the discount rate used for determining liabilities is based on the expected return on assets, the liability amounts in this report cannot be used to assess a settlement of the obligation. The unfunded accrued liability is being amortized by regular annual contributions as a level percentage of payroll within a 30-year period, on the assumption that payroll will increase by 3.00% annually. The assumptions recommended by the actuary are reasonably related to the experience under the Plan and to reasonable expectations of anticipated experience under the Plan.

Since the prior valuation, this valuation reflects revisions to the assumed per capita health care costs.

Our organization has only a contractual relationship with the Virginia Retirement System to provide actuarial consulting services, and we do not provide other services to nor have a financial interest in the Virginia Retirement System. There are no known interests or relationships that our firm has with the Virginia Retirement System that may impair or appear to impair the objectivity of our work.

This is to certify that the independent consulting actuary is a member of the American Academy of Actuaries and has experience in performing valuations for public retirement systems, that the valuation was prepared in accordance with the Actuarial Standards of Practice issued by the Actuarial Standards Board, and that the actuarial calculations were performed by qualified actuaries in accordance with accepted actuarial procedures based on the current provisions of the Plan and on actuarial assumptions that are internally consistent and reasonably based on the actual experience of VRS.

Future actuarial results may differ significantly from the current results presented in this report due to such factors as the following: potential variance in the number and/or type of covered lives; Plan experience differing from that anticipated by the economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the Plan's funded status); and changes in Plan provisions or applicable law. Since the potential impact of such factors is outside the scope of a normal annual actuarial valuation, an analysis of the range of results is not presented herein.



The Board of Trustees
April 14, 2020
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The undersigned are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

The Table of Contents, which immediately follows, outlines the material contained in the report.

Respectfully submitted,

A handwritten signature in blue ink, appearing to read 'Alisa Bennett'.

Alisa Bennett, FSA, EA, FCA, MAAA
President

A handwritten signature in blue ink, appearing to read 'Larry Langer'.

Larry Langer, ASA, EA, FCA, MAAA
Principal and Consulting Actuary

A handwritten signature in blue ink, appearing to read 'Bradley R. Wild'.

Bradley R. Wild, ASA, FCA, MAAA
Senior Actuary

AB/LL/BRW:wl



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Section I – Summary of Principal Results

Introduction and Summary

This report contains the actuarial valuation results as of June 30, 2019 for the Virginia Retirement System (VRS) Line of Duty Act Fund (LODA). The purpose of this report is to recommend rates of contribution on a Pay-As-You-Go funding basis and also to calculate an Actuarially Determined Employer Contribution Rate (ADEC) to be used for GASB 74 purposes.

Employer Contribution Rates:

- Pay-As-You-Go Funding develops LODA Fund Employer Costs Per Full Time Employee (FTE)
- Actuarially Determined Employer Contribution Rate (ADEC) developed for GASB 74 purposes

Development of LODA Fund Employer Costs Per FTE

The June 30, 2019 valuation is used to set contribution rates for fiscal years 2021 and 2022. Odd year valuations are for rate setting; even year valuations are for informational purposes

- Current rate (FY 2019 and 2020) is \$705.77 per FTE.
- New Rate (FY 2021 and 2022) is \$695.18 per FTE.

Section 9.1-400.1 of the *Code of Virginia* requires participating employer contributions to be determined by the Board on a current disbursement basis. Employer contributions per FTE are set such that assets will be sufficient to cover costs for a two year period but will be depleted at the end of the two year period. Funding on a “pay-as-you-go” basis, rather than pre-funding of benefits, requires discount rate to be set lower than rate used for funding of pensions. LODA fund assets are expected to earn 4.75%. Benefit costs are projected as described below and include death benefit payments, DHRM health care premium payments and administrative costs, with health insurance credit (HIC) reimbursements used to offset claims.

Benefit payments are projected based on:

- Demographics of group as of June 30, 2019.
- Health care premium rates as of June 30, 2019.
- Health care trend assumption.
- Actuarial assumptions for:
 - Future death and disabilities
 - Medicare eligibility, Social Security Disability Eligibility
 - Dependent Coverage
 - Mortality

Health Insurance Credit (HIC) Program Reimbursements

- Health Insurance Credits that would have been payable to eligible LODA beneficiaries are transferred to the LODA Fund to offset health care costs provided under the Line of Duty Act.

Administrative Expenses

- Assumed to be \$310,000 for fiscal year 2020 with 3% increases in the future.

LODA Fund contributions are likely to be projected to increase annually since there is no advance-funding. FTE counts are expected to remain level over a two year period and benefit costs will increase with health care inflation.



Section I – Summary of Principal Results (continued)

Development of LODA Fund Actuarially Determined Employer Contribution Rate (ADEC)

The recommended ADEC consists of three pieces which are shown in the summary tables for the LODA:

- **Employer Normal Cost Rate** - The ongoing annual cost of active employees accruing benefits under the plan. This rate is net of the member contribution rate. The normal cost is developed using the entry age normal cost method, which develops normal costs for active members which stay level during their career if benefit provisions are unchanged and assumptions are realized.
- **Administrative Expense** - An estimate of the administrative expenses to be paid out of the trust in the upcoming fiscal year.
- **Amortization of Balance of UAAL** - The amortization of, or payment towards, the unfunded actuarial accrued liability (UAAL) for the year. The UAAL is the amount by which the actuarial value of assets falls short of, or exceeds, the actuarial accrued liability for the plan. The actuarial gains and losses and other changes in the unfunded due to benefit and actuarial assumption and method changes for each valuation will be amortized over a 30 year period.

Assets

Market Value of assets is used for valuation purposes. Section III shows the summary of changes in the market value of assets from the previous year.

Actuarial Assumptions and Methods

Schedules B and C of this report outline the full set of actuarial assumptions and methods used in the current valuation. Effective with the June 30, 2017 valuation, the actuarial assumptions were revised to reflect the results of the experience study for the period 2012 – 2016. The next experience review is expected to be implemented with the June 30, 2021 annual valuation. Liabilities for the ADEC were determined under the Entry Age Normal actuarial cost method.

Benefit Provisions

This actuarial valuation takes into account the provisions of VRS as of the valuation date of June 30, 2019. There have been no changes in plan provisions since the prior valuation. The main benefit provisions are summarized in Schedule D of this report.

Member Data

This actuarial valuation is based on census data supplied by the VRS. The number of active and inactive members is shown in the summary tables below with additional information provided in Section II as well as Schedule E. The Fund received 85 claims in fiscal year 2019 with 68 claims approved. The fund received 169 claims in fiscal year 2018 with 103 claims approved.

Experience

Actuarial experience for the LODA is determined on an actuarially determined basis rather than a pay-as-you-go basis. The LODA experienced an overall actuarial gain for the year ended June 30, 2019, which



Section I – Summary of Principal Results (continued)

means the unfunded actuarial accrued liability was smaller than anticipated. This gain is primarily due to the DHRM healthcare premiums being less than expected based on the prior year premiums and healthcare trend assumption. The gain was somewhat offset by the contribution shortfall which occurs each year because the plan is funded on a pay-as-you-go basis rather than an actuarial basis. Additionally, the plan experienced demographic losses mainly due to more healthcare beneficiaries than expected as of June 30, 2019.

Summary of Results

The results of actuarial valuations are a “snapshot” of the financial position on the valuation date, based on the assumed number of active employees and current beneficiaries. Projections simulate future actuarial valuation results over a forecast period (three years in this case) by “creating” future new hires and performing valuations using the projected membership. The projections provided below assume a stationary active population. In addition, the following items are assumed for the projected results provided in this section of the report:

- Board approved contributions of \$695.18 per FTE employee are made to the LODA Fund for the fiscal years ending June 30, 2021 and June 30, 2022.
- Health Insurance Credit Program (HIC) reimbursements will be used to fund increases to the payment reserve with any excess amounts used to reduce contributions.
- Projected contributions are made at the levels indicated and are paid as scheduled.

All other demographic and economic changes are assumed to occur in accordance with the actuarial assumptions used for the actuarial valuation.

The chart below shows the comparison of the LODA Fund employer costs per FTE

Valuation Date	June 30, 2017 (Board Approved)	June 30, 2018	June 30, 2019 (Board Approved)
Fiscal Year(s)	2019 and 2020	Informational	2021 and 2022
Number of FTE Employees	18,734	19,014	19,243
Contribution per FTE Employee	\$705.77	\$729.25	\$695.18

The chart on the following page shows the projected costs and contributions on a pay as you go basis, assuming a level FTE headcount. Benefit costs, administrative expenses and investment expenses are projected through the end of the two year period, June 30, 2022. Employer contributions are calculated as the amount that, if paid in fiscal years 2021 and 2022 per FTE assuming a level FTE headcount, would allow assets to be sufficient to pay costs for the two year period and be depleted as of the end of the two year period, June 30, 2022.



Section I – Summary of Principal Results (continued)

**PROJECTED PAY AS YOU GO COSTS AND CONTRIBUTIONS
ALL PARTICIPATING EMPLOYER GROUPS
JUNE 30, 2019 VALUATION BASIS**

All Participating Employer Groups - June 30, 2019 Valuation Basis				
	Actual	Projected		
	FY 2019	FY 2020	FY 2021	FY 2022
FTE Employees	19,013.65	19,243.35	19,243.35	19,243.35
Cash Flow (Per FTE Employee)				
Employer Contribution Rate	\$705.77	\$705.77	\$695.18	\$695.18
Benefit Costs	(676.04)	(701.18)	(747.71)	(809.68)
Administrative Expenses	(16.25)	(16.11)	(16.58)	(17.10)
Investment Income and Misc Rev	38.71	23.50	22.45	18.75
Net Cash Flow	52.19	11.98	(46.66)	(112.85)
Cash Flow				
Employer Contributions	\$13,377,000	\$13,581,379	\$13,377,685	\$13,377,685
Benefit Costs	(12,854,000)	(13,493,104)	(14,388,471)	(15,580,980)
Administrative Expenses	(309,000)	(310,000)	(319,000)	(329,000)
Investment Income and Misc Rev	<u>736,000</u>	<u>452,144</u>	<u>431,935</u>	<u>360,727</u>
Net Cash Flow	\$950,000	\$230,419	(\$897,851)	(\$2,171,568)
End of Year Net Position	\$2,839,000	\$3,069,419	\$2,171,568	\$0



Section I – Summary of Principal Results (continued)

The chart below shows the development of the LODA Fund actuarially determined employer contribution Rate (ADEC) together with the results of the prior valuation for comparison purposes.

LINE OF DUTY ACT FUND Actuarially Determined Employer Contribution Rate (ADEC)

Valuation Date	June 30, 2019	June 30, 2018
Number FTE Employees	19,243.35	19,013.65
Number Receiving Benefits	1,173.00	1,115.00
Total	20,416.35	20,128.65
Assets:		
Actuarial Value	\$ 2,839,000	\$ 1,889,000
Market Value	\$ 2,839,000	\$ 1,889,000
Unfunded Actuarial Liability	282,346,100	291,952,709
Amortization Period (Years)	30	30
Annual Required Contribution (ARC) in Dollars:		
Normal Cost*	\$ 13,103,952	\$ 11,654,227
Accrued Liability	11,889,119	12,293,466
Total	\$ 24,993,071	\$ 23,947,693
Contribution Per FTE Employee		
Normal Cost	\$ 664.85	\$ 586.65
Administrative Expenses	16.11	26.29
Total Adjusted Normal Cost	\$ 680.96	\$ 612.94
Accrued Liability	617.83	646.56
Total ARC	\$ 1,298.79	\$ 1,259.50
Expected Benefits Paid**:		
Total	\$ 13,493,104	\$ 13,056,015
Per FTE Employee	\$ 701.18	\$ 686.67
Discount Rate	4.75 %	4.75 %

* Includes administrative expenses of \$310,000 as of June 30, 2019 and \$500,000 as of June 30, 2018.

** Excludes administrative expenses and, starting June 30, 2019, includes offsets for HIC reimbursements.



Section I – Summary of Principal Results (continued)

1. Results are based upon a blended, single group cost basis and the demographic assumptions specific to each employer group. Please refer to Schedule B for additional detail regarding the full set of actuarial assumptions used in the valuation.
2. The valuation as of June 30, 2019 indicates that the Pay as You Go employer contribution rate per FTE is \$695.18 for fiscal years 2021 and 2022 and the Actuarially Determined Employer Contribution is \$1,298.79 per FTE employee payable for the fiscal year ending June 30, 2019.
3. The cost of the lump-sum death benefit for members who die in active service (payment for death occurring as a direct or proximate result of the performance of duty, or by presumptive clause, if still actively employed by a participating employer at the time of death) is payable by the Plan and is included in the actuarial valuation. The liability for the lump-sum benefit paid for death in active service could be segregated from the OPEB liability and assets could be split for active and post-employment purposes. As this may be administratively burdensome, VRS may desire to treat the Plan's entire liability as an OPEB liability for funding and/or accounting purposes.
4. Schedule B and Schedule C of this report outline the full set of actuarial assumptions and the actuarial cost method used in the current valuation. For this purpose, participants have been divided into five groups: VRS State Employees, VRS VaLORS, VRS SPORS, Top 10, and Non-Top 10. Top 10 consists of the following VRS political subdivisions: City of Virginia Beach, City of Chesapeake, and the City of Portsmouth. Non-Top 10 consists of all remaining employer groups, including the National Guard.
5. The main provisions of the Plan, as summarized in Schedule D, were taken into account in the current valuation. In accordance with the passage of HB 1345 (2016) and HB 2243 (2017), starting with the June 30, 2017 valuation, the following is considered:
 - Change in health care cost basis by using the DHRM actuary's estimates of the health care costs of the LODA Health Benefit Plans that provide health care benefits to all LODA Program beneficiaries.



Section I – Summary of Principal Results (continued)

- Changes in LODA Program and Plan administration by estimating the administrative expenses of VRS as the administrator of the Line of Duty Death and Health Benefits Trust Fund.
- Change in benefits for Plan beneficiaries who become eligible for health care benefits as the result of a death or disability occurring after June 30, 2017, where the health care benefits of disabled employees and covered spouses/surviving spouses are discontinued, if a beneficiary is eligible for Medicare due to age (generally age 65).

Changes associated with HB 1345 (2016) and HB 2243 (2017) that were not considered in the June 30, 2019 valuation include the following. These changes were not considered because they are difficult to quantify with limited experience. These changes will continue to be monitored and will be revisited if and when sufficient experience develops.

- The discontinuance of spouse health care coverage if a covered spouse divorces a disabled employee or a covered surviving spouse remarries.
- The potential for VRS' periodic review of the disability status of a disabled employee.
- For those Plan beneficiaries who become eligible for health care benefits as the result of a disability occurring after June 30, 2017, the suspension of health care benefits in years when DHRM verifies current income exceeds salary at the time of the disability, indexed for inflation.

Changes associated with HB 1345 (2016) and HB 2243 (2017) that are included in the plan provisions and assumed to be included in the premium rates as of June 30, 2019 include:

- The extension of health care benefits for dependent children to age 26.
- The expansion of the definition of presumption of death or disability to include infectious diseases.



Section II – Membership Data

1. Data regarding the membership of the Plan for use as a basis of the valuation were furnished by VRS.

VRS collected active Plan participant data for the following participating employer groups:

- Virginia Law Enforcement Officers Retirement System (VaLORS)
 - State Police Officers Retirement System (SPORS)
 - Virginia State Lottery
 - Virginia Department of Conservation and Recreation
 - Virginia Department of Forestry
 - Virginia Department of Motor Vehicles
 - Virginia Department of Emergency Management
 - Virginia Air National Guard
 - Virginia Army National Guard
 - Virginia Port Authority
 - Fire companies or departments that provide fire protection services to Virginia National Guard or Virginia Air National Guard facilities
 - VRS Local Employers' Law Enforcement Officers of participating political subdivisions
 - VRS Local Employers' members performing hazardous duties for participating political subdivisions
 - Arlington County, Town of Appalachia, Town of Boones Mill and Town of Pocahontas (independent from VRS)
 - Firefighters and EMTs of associated participating political subdivisions
2. For the eligible full-time equivalent employee estimate, various employee types are assumed to represent a fraction of a full-time employee.



Section II – Membership Data (continued)

3. The number of unique active lives used in the valuation and the estimate of covered lives is provided in the following table:

THE NUMBER OF ACTIVE LIVES

	Fiscal Year Ending 2018		Fiscal Year Ending 2019			
Employer Group	Employees	FTE Employees	Employees	Weight	FTE Employees	FY 2020 Contributions
State/VaLORS/SPORS	9,830	9,830.00	10,084	100%	10,084.00	\$ 7,116,985
National Guard						
Full-Time	827	827.00	716	100%	716.00	\$ 1,042,493
Part-Time	7,374	737.40	7,611	10%	761.10	
<i>Total State & National Guard Employees</i>	<i>18,031</i>	<i>11,394.40</i>	<i>18,411</i>		<i>11,561.10</i>	<i>\$ 8,159,478</i>
Participating Political Subdivisions						
Full-Time	6,930	6,930.00	7,029	100%	7,029.00	\$ 4,960,857
Volunteers	2,757	689.25	2,613	25%	653.25	\$ 461,044
<i>Total Political Subdivision Employees</i>	<i>9,687</i>	<i>7,619.25</i>	<i>9,642</i>		<i>7,682.25</i>	<i>\$ 5,421,901</i>
Aggregated Total	27,718	19,013.65	28,053		19,243.35	\$ 13,581,379

Based upon 28,053 total lives, the valuation provides results for a group comprised of 19,243.35 FTE employees.

Schedule E shows the distribution by age and service of the number of active lives included in the valuation.



Section II – Membership Data (continued)

4. The following table shows the number of current health care beneficiaries identified as of June 30, 2019 and for the prior valuation date of June 30, 2018.

NUMBER OF HEALTH CARE BENEFICIARIES

Participating Employer Groups as of June 30, 2019			
Beneficiary Type	State	Political Subdivisions	Aggregated Total
Disabled Participants	248	399	647
Spouses of Currently Disabled Participants	167	280	447
<u>Surviving Spouses</u>	<u>36</u>	<u>43</u>	<u>79</u>
Total	451	722	1,173

Participating Employer Groups as of June 30, 2018			
Beneficiary Type	State	Political Subdivisions	Aggregated Total
Disabled Participants	238	381	619
Spouses of Currently Disabled Participants	155	258	413
<u>Surviving Spouses</u>	<u>37</u>	<u>46</u>	<u>83</u>
Total	430	685	1,115

As some beneficiaries elect to cover dependents, assumed adult per capita health care costs include the additional costs for the coverage of dependent children.



Section II – Membership Data (continued)

5. The following table shows a history of health care beneficiary valuation data from the Plan's inception.

SCHEDULE OF HEALTH CARE BENEFICIARIES ADDED TO AND REMOVED FROM ROLLS

Valuation Date	Health Care Beneficiaries					
	Number Added to Rolls	Annual Health Care Benefit Valued	Number Removed from Rolls	Annual Health Care Benefit Valued	Number on Rolls as of the Valuation Date	Annual Health Care Benefit Valued
6/30/2019	85	\$1,096,944	27	\$2,529,540	1,173	\$11,347,896
6/30/2018	127	2,136,689	49	875,112	1,115	12,780,492
6/30/2017	80	2,996,579	83	947,054	1,037	11,518,915
6/30/2016	57	1,053,997	11	79,027	1,040	9,469,390
6/30/2015	70	1,091,255	12	104,397	994	8,494,420
6/30/2014	69	1,188,244	16	105,575	936	7,485,997
6/30/2013	128	1,069,073	66	448,046	883	6,403,328
6/30/2012	99	527,654	500	3,611,321	821	5,782,301
6/30/2011	128	1,230,701	117	845,499	1,222	8,865,969



Section III – Assets

As of June 30, 2019, \$2,839,000 is assumed to be held in a qualified trust solely to provide benefits to disabled employees and their beneficiaries in accordance with the terms of the Plan. In the chart below, it shows the additions and deductions of the Plan for the year preceding the valuation date and a reconciliation of the available fund balances at market value.

RECONCILIATION OF ASSETS LINE OF DUTY ACT FUND

Valuation Date	June 30, 2019	June 30, 2018
1. Funds available at beginning of year	\$ 1,889,000	\$ 3,461,000
Revenue for the year		
Employer contributions	\$ 13,377,000	\$ 10,035,000
Miscellaneous income	658,000	855,000
Net investment income	<u>277,000</u>	<u>678,000</u>
2. Total revenue	\$ 14,312,000	\$ 11,568,000
Expenditures for the year		
Benefit payments	\$ 12,854,000	\$ 12,398,000
Administrative expenses	508,000	742,000
Other expenses	<u>0</u>	<u>0</u>
3. Total expenditures	\$ 13,362,000	\$ 13,140,000
4. Revenue less expenditures (2) - (3)	\$ 950,000	\$ (1,572,000)
5. Funds available at end of year (1) + (4)	\$ 2,839,000	\$ 1,889,000



Section IV – Accounting Information

1. A distribution of the number of members by type of membership, as follows:

NUMBER OF ALL MEMBERS AS OF JUNE 30, 2019

Group	Count
Active Members (FTE Employees)	19,243
Disabled Members	647
Spouses of Disabled Members	447
<u>Surviving Spouses</u>	<u>79</u>
Total	20,416

2. The Schedule of Funding Progress, shown in the following table:

SCHEDULE OF FUNDING PROGRESS (\$ IN THOUSANDS)

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL)* (b)	Unfunded AAL (UAAL) (b - a)	Funded Ratio (a / b)
6/30/2019	\$ 2,839	\$ 285,185	\$ 282,346	1.00%
6/30/2018	1,889	293,842	291,953	0.64
6/30/2017	3,461	270,379	266,918	1.28
6/30/2016	2,708	224,683	221,975	1.21
6/30/2015	728	245,808	245,080	0.30
6/30/2014	0	225,816	225,816	0.00
6/30/2013	0	204,084	204,084	0.00
6/30/2012	0	226,174	226,174	0.00
6/30/2011	0	398,956	398,956	0.00

*Actuarial cost method of Projected Unit Credit prior to 6/30/2013, Entry Age Normal (Level Dollar) for 6/30/2014 and 6/30/2015, and Entry Age Normal (Level Percent of Pay) thereafter.



Section IV – Accounting Information (continued)

3. The information presented was determined as part of the actuarial valuation at June 30, 2019. Additional information as of the latest actuarial valuation follows:

Valuation Date	June 30, 2019
Actuarial Cost Method	Entry Age Normal
Amortization Method	
Accrued Liability	Level Percentage of Pay, Open
Payroll Growth Rate	3.00%
Remaining Amortization Period	
Accrued Liability	30 Years
Asset Valuation Method	Market Value of Assets
Actuarial Assumptions:	
Investment Rate of Return*	4.75%
*Includes Inflation at	2.50%
Medical Trend Assumption (Under Age 65)	7.00% - 4.75%
Medical Trend Assumption (Ages 65 and Older)	5.375% - 4.75%
Year of Ultimate Trend Rate (Under Age 65)	Fiscal Year Ended 2028
Year of Ultimate Trend Rate (Ages 65 and Older)	Fiscal Year Ended 2023

The assumed investment rate of return reflects the fact that the Plan is to be funded on a current disbursement basis.



Section V – Derivation of Experience Gains and Losses

**CHANGES IN UNFUNDED ACTUARIAL ACCRUED LIABILITIES (UAAL)
(\$ IN MILLIONS)**

Fiscal Year 2019	
1. Beginning of Year:	
(a) Actuarial Accrued Liability (AAL)	\$ 293.8
(b) Normal Cost	11.7
(c) Benefit Payments	12.9
2. End of Year:	
(a) Expected AAL	306.8
$[(1a) + (1b)] \times 1.0475 - [(1c) \times (1 + [0.0475 \times 0.50])]$	
(b) Actual AAL, with expected premiums	325.9
(c) Actual AAL, with actual premiums	285.2
3. Total AAL Gain (Loss)	
(a) Demographic Experience (2a) - (2b)	(19.1)
(b) Premium Experience (2b) - (2c)	40.7
Total	21.6
4. Actuarial Value of Assets (AVA) Beginning of Year	1.9
5. Net External Cash Flow During the Year	
(a) Expected Contributions	23.9
(b) Actual Contributions	14.0
(c) Benefit Payments	12.9
6. End of Year:	
(a) Expected AVA with Expected Contributions	13.8
$[(4) + (5a)] \times 1.0475 - [(5c) \times (1 + [0.0475 \times 0.50])]$	
(b) Expected AVA with Actual Contributions	3.4
$[(4) + (5b)] \times 1.0475 - [(5c) \times (1 + [0.0475 \times 0.50])]$	
(c) Actual AVA	2.8
7. AVA Gain (Loss)	
(a) Investment Experience (2c) - (2b)	(0.6)
(b) Gain (Loss) due to Contribution Shortfall (2b) - (2a)	(10.4)
Total	(11.0)
8. Expected UAAL at End of Year	293.0
(2a) - (6a)	
9. Actual UAAL at End of Year	282.4
(2b) - (6b)	
10. UAAL Gain (Loss)	
(a) Experience 3 + 7a	21.0
(b) Gain (Loss) due to Contribution Shortfall (7b)	(10.4)
Total	10.6



Schedule A – Results of the Valuation

**LINE OF DUTY ACT FUND
DEVELOPMENT OF
ACTUARIALLY DETERMINED EMPLOYER CONTRIBUTION RATE**

	Valuation Date	
	June 30, 2019	June 30, 2018
1 NUMBER OF FTE EMPLOYEES	19,243.35	19,013.65
2 ACTUARIAL ACCRUED LIABILITY Present value of prospective benefits payable in respect of:		
(a) Present active members	\$172,708,525	\$150,590,715
(b) Present beneficiaries	<u>\$248,194,882</u>	<u>\$257,076,114</u>
(c) Total present value of prospective benefits	\$420,903,407	\$407,666,829
(d) Present value of future normal contributions	<u>\$135,718,307</u>	<u>\$113,825,120</u>
(e) Total actuarial accrued liability (2c) – (2d)	\$285,185,100	\$293,841,709
3 PRESENT ASSETS FOR VALUATION PURPOSES	\$ 2,839,000	\$1,889,000
4 UNFUNDED ACTUARIAL ACCRUED LIABILITY (2e) – (3)	\$282,346,100	\$291,952,709
5 AMORTIZATION PERIOD	30	30
6 NORMAL CONTRIBUTION*	\$13,103,952	\$11,654,227
7 ACCRUED LIABILITY CONTRIBUTION	<u>\$11,889,119</u>	<u>\$12,293,466</u>
8 TOTAL CONTRIBUTION (6) + (7)	\$24,993,071	\$23,947,693
9 NORMAL CONTRIBUTION PER FTE EMPLOYEE* (6) ÷ (1)	\$680.96	\$612.94
10 ACCRUED LIABILITY CONTRIBUTION PER FTE EMPLOYEE (7) ÷ (1)	<u>\$617.83</u>	<u>\$646.56</u>
11 TOTAL CONTRIBUTION PER FTE EMPLOYEE (9) + (10)	\$1,298.79	\$1,259.50
12 DISCOUNT RATE**	4.75%	4.75%

* Includes administrative expenses.

** The assumed annual rate of return of 4.75% represents a blend between the long term rate of 6.75% to the extent the fund has assets and a short term bond rate once the assets have been depleted.



Schedule A – Solvency Test

**SOLVENCY TEST
(\$ IN THOUSANDS)**

	Aggregate Accrued Liabilities For				Actuarial Value of Assets	Portion of Accrued Liabilities Covered by Actuarial Value of Assets		
	(1) Active Member Contribut- ions	(2) Retirees, Survivors, and Inactive Members	(3) Active Members (Employer Financed Portion)	Total		(1)	(2)	(3)
6/30/2019	n/a	\$248,195	\$36,990	\$285,185	\$2,839	n/a	1.14%	0.00%
6/30/2018	n/a	257,076	36,766	293,842	1,889	n/a	0.73	0.00
6/30/2017	n/a	233,193	37,186	270,379	3,461	n/a	1.48	0.00
6/30/2016	n/a	192,578	32,105	224,683	2,708	n/a	1.41	0.00
6/30/2015	n/a	169,288	76,520	245,808	728	n/a	0.43	0.00
6/30/2014	n/a	152,120	73,696	225,816	0	n/a	0.00	0.00
6/30/2013	n/a	139,835	64,249	204,084	0	n/a	0.00	0.00
6/30/2012	n/a	131,501	94,673	226,174	0	n/a	0.00	0.00
6/30/2011	n/a	207,186	191,770	398,956	0	n/a	0.00	0.00



Schedule B – Outline of Actuarial Assumptions and Methods

Assumptions and Methods Applicable to All Line of Duty Act Fund Employer Groups

The assumptions and methods used in the valuations were based on the results of an actuarial experience study for the period from July 1, 2012 through June 30, 2016.

Investment Return Rate: 4.75% per annum, compounded annually,

Inflation Assumption: 2.50% per year.

Actuarial Cost Method: Entry age normal cost method, allocated as a level percent of payroll, from first funding age to last age before terminal retirement age. Actuarial gains and losses, as they occur, are reflected in the unfunded actuarial accrued liability. See Schedule C for a detailed explanation.

Funding Period: Pay-As-You-Go Funding develops LODA Fund Employer Costs Per Full Time Employee (FTE) while the Actuarially Determined Employer Contribution Rate (ADEC) developed for GASB 74 purposes utilizes amortization as a level percentage of payroll over a 30 year period.

Payroll Growth Rate: 3.00% per annum.

Asset Valuation Method: Market Value of Assets

Service Related Disabilities: Disabilities are assumed to be service related and result in coverage under the Plan based on the following:

Group	Qualifying Disability %
State	10%
SPORS	70%
VaLORS	10%
Non Top 10 LEOS	65%
Top 10 LEOS	70%

Service Related Deaths: Active employee death are assumed to be service related and result in coverage under the Plan based on the following:

Group	Qualifying Death %
State	20%
SPORS	50%
VaLORS	20%
Non Top 10 LEOS	20%
Top 10 LEOS	35%

Of the service related deaths, 42% are assumed to be paid as a direct or proximate result of the performance of duty, with the remainder paid under the presumptive clause.



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

Assumptions and Methods Applicable to All Line of Duty Act Fund Employer Groups

- Retirement Eligibility:** VRS State Employees (including those of the Virginia Port Authority) hired prior to January 1, 2008 are assumed to be eligible to retire at age 55 with 5 years of creditable service or age 50 with 10 years of creditable service. VRS State Employees hired on or after January 1, 2008 are assumed to be eligible to retire at age 60 with 5 years of creditable service or upon the sum of their age and their service being 90 (Rule of 90). All other employees are assumed to be eligible for retirement at age 50 with 5 years of creditable service.
- Spouse Health Care Coverage:** Actual data provided is used for current beneficiaries. 67% of service-related deaths and 80% of service-related disabilities are assumed to result in spouse coverage, with wives assumed to be three years younger than husbands.
- Administrative Expenses:** Assumed to be \$310,000 for fiscal year 2020 with 3% increases in the future. Administrative expenses paid from the fund assume an offset of administrative fees collected from opt-out employers to process claims.
- VRS Health Insurance Credit:** Health care costs of the Plan are assumed to be reduced by an amount equal to the disabled health insurance credit paid by the VRS Health Insurance Credit Program for eligible disabled employees. An annual credit of \$1,440 or \$48 per year of service, whichever is greater, is assumed for those employees who are members of the VRS State, VaLORS, or SPORS plans and an annual credit of \$540 is assumed for those employees who are members of a VRS political subdivision participating in the VRS Health Insurance Credit Program.
- Health Care Cost Trend Rate:** The initial per capita health care costs are expected to increase each year with inflation (trend). The following chart details the trend assumption.

Fiscal Year Ended	Under Age 65	Ages 65 and Older
2019	7.00%	5.375%
2020	6.75%	5.250%
2021	6.50%	5.125%
2022	6.25%	5.000%
2023	6.00%	4.750%
2024	5.75%	4.750%
2025	5.50%	4.750%
2026	5.25%	4.750%
2027	5.00%	4.750%
2028 and Beyond	4.75%	4.750%



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

Assumptions and Methods Applicable to All Line of Duty Act Fund Employer Groups

Eligibility for Medicare Due to Age: For Plan beneficiaries who become eligible for health care benefits as the result of a death or disability occurring after June 30, 2017, 80% of disabled employees who become disabled 29 or more months prior to their sixty-fifth birthday are assumed to be eligible for Medicare due to age (age 65). 100% of all other Plan beneficiaries who become eligible for health care benefits as the result of a death or disability occurring after June 30, 2017 are assumed to be eligible for Medicare due to age.

Initial Per Capita Health Care Costs: Health care premium amounts were provided by DHRM. CMC accepted this information without audit and has relied upon the sources for the accuracy of the data.

Assumed adult per capita costs are based on actual premiums and tier elections trended forward to the valuation period. As some beneficiaries elect to cover dependents, the assumed adult costs include the additional costs for the coverage of dependent children.

Initial Monthly Per Capita Adult Health Care Costs		
Valuation Date	Under Age 65*	Ages 65 and Older
June 30, 2017	\$1,065.70	\$505.00
June 30, 2018	\$1,186.01	\$506.50
June 30, 2019	\$1,137.63	\$406.60

*Includes the assumed additional cost for the coverage of dependent children.



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

Assumptions and Methods Applicable to All Line of Duty Act Fund Employer Groups

Age Related Morbidity:

All health care costs assumed not to be related to covered dependent children are age-adjusted. The following chart details the expected health care claims, age-adjusted to age 65, and the associated assumed increases to the net incurred claims:

Beneficiary Attained Age	Annual Increase
<30	0.0%
30 – 34	1.0%
35 – 39	1.5%
40 – 44	2.0%
45 - 49	2.6%
50 – 54	3.3%
55 – 59	3.6%
60 – 64	4.2%
65 – 69	3.0%
70 – 74	2.5%
75 – 79	2.0%
80 – 84	1.0%
85 – 89	0.5%
90 and Older	0.0%



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

STATE EMPLOYEES¹

Plan Specific Assumptions and Methods

MORTALITY RATES:

Pre-Retirement:

RP-2014 Employee Rates to age 80, Healthy Annuitant Rates at ages 81 and older projected with Scale BB to 2020; males setback 1 year, 85% of rates; females setback 1 year

Post-Retirement:

R P-2014 Employee Rates to age 49, Healthy Annuitant Rates at ages 50 and older projected with Scale BB to 2020; males set forward 1 year; 1.5% increase compounded from ages 70 to 85, females setback 1 year

Post-Disablement:

RP-2014 Disabled Mortality Rates projected with Scale BB to 2020; males 115% of rates; females 130% of rates

State Employees Mortality Rates						
Age	Male			Female		
	Pre Retirement	Post Retirement	Post Disablement	Pre Retirement	Post Retirement	Post Disablement
20	0.00031	0.00044	0.00803	0.00016	0.00016	0.00285
25	0.00043	0.00045	0.00957	0.00017	0.00017	0.00304
30	0.00037	0.00046	0.00894	0.00020	0.00020	0.00383
35	0.00042	0.00053	0.01035	0.00027	0.00027	0.00503
40	0.00050	0.00066	0.01242	0.00036	0.00036	0.00696
45	0.00073	0.00107	0.01925	0.00058	0.00058	0.01155
50	0.00127	0.00431	0.02304	0.00098	0.00098	0.01520
55	0.00211	0.00599	0.02639	0.00151	0.00333	0.01827
60	0.00345	0.00789	0.02933	0.00214	0.00454	0.02081
65	0.00587	0.01102	0.03389	0.00315	0.00684	0.02522
70	0.00970	0.01677	0.04238	0.00527	0.01104	0.03410
75		0.02704	0.05702		0.01930	0.04963
80		0.04548	0.08047		0.03437	0.07380
85		0.07920	0.11900		0.06378	0.10933
90		0.14247	0.18618		0.11280	0.16137

Mortality improvement is anticipated under the post-retirement mortality assumption as projected with Scale BB.

¹ The actuarial assumptions for State are also applied to the applicable members of the Optional Retirement Plan (ORP)



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

RETIREMENT RATES: The following rates of retirement are assumed for members eligible to retire from Plan 1.

State Employees Retirement Rates, Plan 1 Male							
Age	Years of service						
	0-4	5	6-9	10	11-29	30	≥31
≤49	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.033	0.033	0.125	0.125
51	0.000	0.000	0.000	0.033	0.030	0.080	0.090
52	0.000	0.000	0.000	0.033	0.030	0.080	0.090
53	0.000	0.000	0.000	0.033	0.030	0.050	0.090
54	0.000	0.000	0.000	0.033	0.030	0.050	0.090
55	0.000	0.045	0.045	0.045	0.035	0.050	0.090
56	0.000	0.045	0.040	0.040	0.040	0.050	0.090
57	0.000	0.045	0.040	0.040	0.040	0.075	0.090
58	0.000	0.045	0.040	0.040	0.040	0.100	0.090
59	0.000	0.045	0.040	0.040	0.040	0.100	0.090
60	0.000	0.045	0.050	0.050	0.050	0.115	0.090
61	0.000	0.150	0.075	0.075	0.075	0.165	0.150
62	0.000	0.150	0.100	0.100	0.100	0.200	0.200
63	0.000	0.150	0.100	0.100	0.100	0.200	0.175
64	0.000	0.150	0.135	0.135	0.135	0.200	0.175
65	0.000	0.250	0.250	0.250	0.250	0.250	0.250
66	0.000	0.275	0.250	0.250	0.250	0.250	0.250
67	0.000	0.275	0.220	0.220	0.220	0.220	0.220
68	0.000	0.200	0.220	0.220	0.220	0.220	0.220
69	0.000	0.200	0.220	0.220	0.220	0.220	0.220
70	0.000	0.200	0.220	0.220	0.220	0.220	0.220
71	0.000	0.200	0.220	0.220	0.220	0.220	0.220
72	0.000	0.200	0.220	0.220	0.220	0.220	0.220
73	0.000	0.200	0.220	0.220	0.220	0.220	0.220
74	0.000	0.200	0.220	0.220	0.220	0.220	0.220
≥75	0.000	1.000	1.000	1.000	1.000	1.000	1.000



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

State Employees Retirement Rates, Plan 1 Female							
Age	Years of service						
	0-4	5	6-9	10	11-29	30	≥31
≤49	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.030	0.030	0.075	0.075
51	0.000	0.000	0.000	0.035	0.030	0.075	0.060
52	0.000	0.000	0.000	0.035	0.030	0.075	0.060
53	0.000	0.000	0.000	0.035	0.035	0.100	0.090
54	0.000	0.000	0.000	0.050	0.035	0.100	0.090
55	0.000	0.050	0.050	0.050	0.040	0.100	0.090
56	0.000	0.050	0.050	0.050	0.050	0.100	0.090
57	0.000	0.050	0.050	0.050	0.050	0.100	0.090
58	0.000	0.050	0.050	0.050	0.050	0.100	0.090
59	0.000	0.050	0.050	0.050	0.050	0.100	0.090
60	0.000	0.050	0.050	0.050	0.050	0.120	0.125
61	0.000	0.075	0.080	0.080	0.080	0.165	0.175
62	0.000	0.100	0.120	0.120	0.120	0.225	0.250
63	0.000	0.175	0.120	0.120	0.120	0.225	0.175
64	0.000	0.175	0.150	0.150	0.150	0.225	0.175
65	0.000	0.275	0.275	0.275	0.275	0.275	0.300
66	0.000	0.300	0.300	0.300	0.300	0.300	0.300
67	0.000	0.300	0.250	0.250	0.250	0.250	0.250
68	0.000	0.250	0.250	0.250	0.250	0.250	0.250
69	0.000	0.250	0.250	0.250	0.250	0.250	0.250
70	0.000	0.250	0.250	0.250	0.250	0.250	0.250
71	0.000	0.250	0.250	0.250	0.250	0.250	0.250
72	0.000	0.250	0.250	0.250	0.250	0.250	0.250
73	0.000	0.250	0.250	0.250	0.250	0.250	0.250
74	0.000	0.250	0.250	0.250	0.250	0.250	0.250
≥75	0.000	1.000	1.000	1.000	1.000	1.000	1.000



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

RETIREMENT RATES: The following rates of retirement are assumed for members eligible to retire from Plan 2 and the Hybrid Plan.

State Employees Retirement Rates, Plan 2 and Hybrid Male																		
Age	Years of service																	
	0-4	5	6-25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	≥40
≤49	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125
51	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080
52	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.090
53	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.050	0.050	0.090	0.090
54	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.050	0.050	0.090	0.090	0.090
55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.050	0.050	0.090	0.090	0.090	0.090
56	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.050	0.050	0.090	0.090	0.090	0.090	0.090
57	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.075	0.075	0.090	0.090	0.090	0.090	0.090	0.090
58	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.100	0.100	0.090	0.090	0.090	0.090	0.090	0.090	0.090
59	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.100	0.100	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
60	0.000	0.045	0.045	0.045	0.045	0.045	0.045	0.115	0.115	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
61	0.000	0.150	0.075	0.075	0.075	0.075	0.165	0.165	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150
62	0.000	0.150	0.100	0.100	0.100	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
63	0.000	0.150	0.100	0.100	0.200	0.200	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175
64	0.000	0.150	0.135	0.200	0.200	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175
65	0.000	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
66	0.000	0.275	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
67	0.000	0.275	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220
68	0.000	0.200	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220
69	0.000	0.200	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220
70	0.000	0.200	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220
71	0.000	0.200	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220
72	0.000	0.200	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220
73	0.000	0.200	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220
74	0.000	0.200	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220
≥75	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

State Employees Retirement Rates, Plan 2 and Hybrid Female																		
Age	Years of service																	
	0-4	5	6-25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	≥40
≤49	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.075
51	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.075	0.075
52	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.075	0.075	0.060
53	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.100	0.100	0.090	0.090
54	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.100	0.100	0.090	0.090	0.090
55	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.100	0.100	0.090	0.090	0.090	0.090
56	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.100	0.100	0.090	0.090	0.090	0.090	0.090
57	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.100	0.100	0.090	0.090	0.090	0.090	0.090	0.090
58	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.100	0.100	0.090	0.090	0.090	0.090	0.090	0.090	0.090
59	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.100	0.100	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
60	0.000	0.050	0.050	0.050	0.050	0.050	0.050	0.120	0.120	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125
61	0.000	0.075	0.080	0.080	0.080	0.080	0.165	0.165	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175
62	0.000	0.100	0.120	0.120	0.120	0.225	0.225	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
63	0.000	0.175	0.120	0.120	0.225	0.225	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175
64	0.000	0.175	0.150	0.225	0.225	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175
65	0.000	0.275	0.275	0.275	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300
66	0.000	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300
67	0.000	0.300	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
68	0.000	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
69	0.000	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
70	0.000	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
71	0.000	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
72	0.000	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
73	0.000	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
74	0.000	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
≥75	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

DISABILITY RATES: As shown below for selected ages.

State Employees Disability Rates		
Age	Male	Female
20	0.00039	0.00033
25	0.00072	0.00100
30	0.00091	0.00211
35	0.00129	0.00281
40	0.00212	0.00354
45	0.00343	0.00474
50	0.00497	0.00629
55	0.00629	0.00742
60	0.00690	0.00735
65	0.00657	0.00653
70	0.00572	0.00841



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

TERMINATION RATES: The following are sample withdrawal rates based on age and years of service (for causes other than death, disability, or retirement).

State Employees Termination Rates, Male											
Age	Years of service										
	0	1	2	3	4	5	6	7	8	9	≥10
20	0.25852	0.25852	0.25694	0.23691	0.19663	0.15321	0.11602	0.09132	0.08331	0.08331	0.08331
25	0.22297	0.22297	0.22056	0.20171	0.16921	0.13670	0.10954	0.09132	0.08251	0.07732	0.07214
30	0.17601	0.17601	0.17095	0.15425	0.13244	0.11401	0.10011	0.08993	0.08095	0.06790	0.05485
35	0.15120	0.14553	0.13631	0.12195	0.10694	0.09577	0.08902	0.08387	0.07574	0.05878	0.04183
40	0.14480	0.12618	0.11198	0.09890	0.08767	0.08029	0.07681	0.07442	0.06799	0.04938	0.03077
45	0.14223	0.11470	0.09617	0.08321	0.07345	0.06888	0.06600	0.06412	0.05934	0.04282	0.02630
50	0.13789	0.10668	0.08617	0.07370	0.06544	0.06362	0.05994	0.05630	0.05128	0.03879	0.02630
55	0.13242	0.10032	0.08050	0.07094	0.06491	0.06348	0.05950	0.05391	0.04470	0.03550	0.02630
60	0.13038	0.09617	0.07857	0.07094	0.06491	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
65	0.13038	0.09477	0.07859	0.07094	0.06491	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
70	0.13038	0.09477	0.07859	0.07094	0.06491	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

State Employees Termination Rates, Female											
Age	Years of service										
	0	1	2	3	4	5	6	7	8	9	≥10
20	0.31434	0.31434	0.30334	0.27392	0.23350	0.18606	0.14708	0.12545	0.12362	0.12362	0.12362
25	0.26747	0.26747	0.25594	0.23170	0.20061	0.16601	0.13663	0.11705	0.11136	0.11136	0.11136
30	0.21874	0.20726	0.19398	0.17630	0.15700	0.13853	0.12163	0.10538	0.09500	0.09045	0.09045
35	0.19257	0.17078	0.15532	0.14101	0.12758	0.11658	0.10633	0.09380	0.08241	0.07177	0.06019
40	0.17770	0.14790	0.12987	0.11685	0.10577	0.09775	0.09030	0.08135	0.07188	0.05904	0.03747
45	0.17029	0.13335	0.11247	0.09984	0.08920	0.08275	0.07531	0.06872	0.06277	0.05214	0.03025
50	0.16721	0.12286	0.09934	0.08763	0.07822	0.07316	0.06479	0.05936	0.05545	0.05088	0.03025
55	0.16695	0.11694	0.09149	0.08236	0.07660	0.07039	0.06175	0.05711	0.05138	0.05088	0.03025
60	0.16695	0.11656	0.09060	0.08236	0.07660	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
65	0.16695	0.11656	0.09060	0.08236	0.07660	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
70	0.16695	0.11656	0.09060	0.08236	0.07660	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

SALARY INCREASE RATES: The following total salary increase rates are used. The total salary increase rate consists of an inflation rate of 2.50%, a productivity component of 1.00%, and a variable merit component that is dependent on years of service.

Pay Increase Assumption	
Years of Service	Total Increase (Next Year)
1	5.35%
2	5.35
3	4.75
4	4.45
5	4.45
6	4.45
7	4.35
8	4.25
9	4.00
10	4.00
11-19	3.65
20 or more	3.50



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

STATE POLICE

Plan Specific Assumptions and Methods

MORTALITY RATES:

Pre-Retirement:

RP-2014 Employee Rates to age 80, Healthy Annuitant Rates at ages 81 and older projected with Scale BB to 2020; males 90% of rates; females set forward 1 year

Post-Retirement:

RP-2014 Employee Rates to age 49, Healthy Annuitant Rates at ages 50 and older projected with Scale BB to 2020; males set forward 1 year with 1.0% increase compounded from ages 70 to 90; females set forward 3 years

Post-Disablement:

RP-2014 Disabled Mortality Rates projected with Scale BB to 2020; males set forward 2 years; unisex using 100% male

SPORS Mortality Rates						
Age	Male			Female		
	Pre Retirement	Post Retirement	Post Disablement	Pre Retirement	Post Retirement	Post Disablement
20	0.00036	0.00044	0.00839	0.00016	0.00016	0.00839
25	0.00043	0.00045	0.00772	0.00018	0.00019	0.00772
30	0.00040	0.00046	0.00820	0.00023	0.00025	0.00820
35	0.00046	0.00053	0.00948	0.00030	0.00033	0.00948
40	0.00056	0.00066	0.01247	0.00043	0.00052	0.01247
45	0.00086	0.00107	0.01810	0.00072	0.00089	0.01810
50	0.00149	0.00431	0.02124	0.00118	0.00317	0.02124
55	0.00246	0.00599	0.02397	0.00174	0.00423	0.02397
60	0.00405	0.00789	0.02682	0.00247	0.00625	0.02682
65	0.00693	0.01102	0.03182	0.00383	0.00989	0.03182
70	0.01139	0.01694	0.04125	0.00653	0.01601	0.04125
75		0.02871	0.05658		0.02631	0.05658
80		0.05074	0.08141		0.04493	0.08141
85		0.09286	0.12299		0.07928	0.12299
90		0.17558	0.19143		0.14077	0.19143

Mortality improvement is anticipated under the post-retirement mortality assumption as projected with Scale BB.



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

RETIREMENT RATES: The following rates of retirement are assumed for members eligible to retire.

SPORS Retirement Rates			
Age	Years of service		
	0-4	5-24	>=25
<=49	0.000	0.000	0.000
50	0.000	0.100	0.100
51	0.000	0.030	0.100
52	0.000	0.030	0.100
53	0.000	0.030	0.100
54	0.000	0.030	0.100
55	0.000	0.060	0.100
56	0.000	0.060	0.100
57	0.000	0.060	0.100
58	0.000	0.100	0.100
59	0.000	0.100	0.100
60	0.000	0.100	0.100
61	0.000	0.100	0.100
62	0.000	0.200	0.200
63	0.000	0.200	0.200
64	0.000	0.200	0.200
>=65	0.000	1.000	1.000



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

DISABILITY RATES: As shown below for selected ages.

SPORS Disability Rates	
Age	Unisex
<=44	0.00194
45	0.00233
50	0.00481
55	0.00770
60	0.00897
65	0.01108
70	0.01368

TERMINATION RATES: The following are sample withdrawal rates based on age and years of service (for causes other than death, disability, or retirement).

SPORS Termination Rates	
Service	Unisex
0	0.09750
1	0.04750
2	0.04750
3	0.04750
4	0.04750
5	0.04750
6	0.04750
7	0.03000
8	0.03000
9	0.03000
>=10	0.01750



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

SALARY INCREASE RATES: The following salary increase rates are used. Inflation rate of 2.50% plus productivity component of 1.00% plus step-rate/promotional component as shown:

Pay Increase Assumption	
Years of Service	Total Increase (Next Year)
1	4.75%
2	4.75
3	4.75
4	4.75
5	4.65
6	4.40
7	4.40
8	4.40
9	4.40
10 - 19	4.00
20 or more	3.50



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

VIRGINIA LAW OFFICERS
Plan Specific Assumptions and Methods

MORTALITY RATES:

Pre-Retirement:

RP-2014 Employee Rates to age 80, Healthy Annuitant Rates at ages 81 and older
 Projected BB to 2020; M 90% of Rates; F SF 1yr

Post-Retirement:

RP-2014 Employee Rates to age 49, Healthy Annuitant Rates at ages 50 and older
 Projected BB to 2020; M SF 1yr, 1% increase compounded from ages 70 to 90; F SF 3yr.

Post-Disablement:

RP-2014 Disabled Mortality Rates Projected BB to 2020; M SF 2yr; Unisex using 100% Male.

VaLORS Mortality Rates						
Age	Male			Female		
	Pre Retirement	Post Retirement	Post Disablement	Pre Retirement	Post Retirement	Post Disablement
20	0.00036	0.00044	0.00839	0.00016	0.00016	0.00839
25	0.00043	0.00045	0.00772	0.00018	0.00019	0.00772
30	0.00040	0.00046	0.00820	0.00023	0.00025	0.00820
35	0.00046	0.00053	0.00948	0.00030	0.00033	0.00948
40	0.00056	0.00066	0.01247	0.00043	0.00052	0.01247
45	0.00086	0.00107	0.01810	0.00072	0.00089	0.01810
50	0.00149	0.00431	0.02124	0.00118	0.00317	0.02124
55	0.00246	0.00599	0.02397	0.00174	0.00423	0.02397
60	0.00405	0.00789	0.02682	0.00247	0.00625	0.02682
65	0.00693	0.01102	0.03182	0.00383	0.00989	0.03182
70	0.01139	0.01694	0.04125	0.00653	0.01601	0.04125
75		0.02871	0.05658		0.02631	0.05658
80		0.05074	0.08141		0.04493	0.08141
85		0.09286	0.12299		0.07928	0.12299
90		0.17558	0.19143		0.14077	0.19143

Mortality improvement is anticipated under the post-retirement mortality assumption as projected with Scale BB.



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

RETIREMENT RATES: The following rates of retirement are assumed for members eligible to retire.

VaLORS Retirement Rates, Male					
Age	Years of service				
	0-4	5	6-24	25	>=26
<=49	0.000	0.000	0.000	0.000	0.000
50	0.000	0.110	0.110	0.350	0.350
51	0.000	0.100	0.080	0.300	0.250
52	0.000	0.100	0.080	0.300	0.250
53	0.000	0.100	0.080	0.300	0.250
54	0.000	0.100	0.080	0.240	0.250
55	0.000	0.100	0.080	0.180	0.250
56	0.000	0.100	0.090	0.180	0.200
57	0.000	0.100	0.100	0.180	0.200
58	0.000	0.100	0.100	0.180	0.200
59	0.000	0.100	0.120	0.180	0.200
60	0.000	0.180	0.180	0.180	0.200
61	0.000	0.180	0.200	0.200	0.200
62	0.000	0.180	0.400	0.400	0.400
63	0.000	0.400	0.250	0.250	0.250
64	0.000	0.150	0.250	0.250	0.250
>=65	0.000	1.000	1.000	1.000	1.000



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

VaLORS Retirement Rates, Female					
Age	Years of service				
	0-4	5	6-24	25	>=26
<=49	0.000	0.000	0.000	0.000	0.000
50	0.000	0.100	0.100	0.375	0.375
51	0.000	0.100	0.080	0.250	0.200
52	0.000	0.100	0.080	0.250	0.200
53	0.000	0.100	0.080	0.250	0.225
54	0.000	0.100	0.080	0.250	0.250
55	0.000	0.100	0.080	0.250	0.275
56	0.000	0.100	0.080	0.250	0.300
57	0.000	0.100	0.080	0.250	0.225
58	0.000	0.100	0.080	0.400	0.225
59	0.000	0.100	0.130	0.300	0.225
60	0.000	0.200	0.200	0.200	0.225
61	0.000	0.200	0.225	0.225	0.225
62	0.000	0.200	0.300	0.300	0.300
63	0.000	0.200	0.250	0.250	0.250
64	0.000	0.200	0.250	0.250	0.250
>=65	0.000	1.000	1.000	1.000	1.000



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

DISABILITY RATES: As shown below for selected ages.

VaLORS Disability Rates		
Age	Male	Female
20	0.00143	0.00543
25	0.00322	0.00581
30	0.00584	0.00659
35	0.00720	0.00769
40	0.00793	0.01001
45	0.00913	0.01381
50	0.01165	0.01821
55	0.01501	0.02277
60	0.01782	0.02901
65	0.01916	0.03865
70	0.01920	0.05499



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

TERMINATION RATES: The following are sample withdrawal rates based on age and years of service (for causes other than death, disability, or retirement).

VaLORS Termination Rates, Male											
Age	Years of service										
	0	1	2	3	4	5	6	7	8	9	≥10
20	0.31876	0.28460	0.25466	0.22550	0.19680	0.16134	0.13524	0.12367	0.12367	0.12367	0.12367
25	0.30264	0.26915	0.23838	0.20793	0.17797	0.14758	0.12544	0.11510	0.11510	0.11510	0.11510
30	0.28066	0.24612	0.21425	0.18325	0.15307	0.12980	0.11286	0.10375	0.10098	0.10098	0.10098
35	0.25749	0.21974	0.18823	0.16020	0.13400	0.11603	0.10242	0.09350	0.08615	0.07590	0.06050
40	0.23639	0.19311	0.16185	0.13861	0.11962	0.10471	0.09313	0.08358	0.07325	0.05907	0.04275
45	0.22182	0.17034	0.13792	0.12032	0.11173	0.09580	0.08484	0.07391	0.06240	0.05163	0.04275
50	0.21689	0.15441	0.11855	0.10683	0.10683	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
55	0.21689	0.14708	0.10525	0.09930	0.09930	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
60	0.21689	0.14673	0.09871	0.09787	0.09787	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
65	0.21689	0.14673	0.09796	0.09787	0.09787	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
70	0.21689	0.14673	0.09796	0.09787	0.09787	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

VaLORS Termination Rates, Female											
Age	Years of service										
	0	1	2	3	4	5	6	7	8	9	≥10
20	0.34816	0.33235	0.29905	0.25161	0.20346	0.15381	0.13567	0.10072	0.09919	0.09919	0.09919
25	0.33633	0.30645	0.27155	0.23161	0.19212	0.15381	0.13567	0.10072	0.09919	0.09919	0.09919
30	0.32698	0.27494	0.23556	0.20432	0.17667	0.15381	0.13567	0.10072	0.09919	0.09066	0.09066
35	0.32025	0.25204	0.20727	0.17948	0.15980	0.14868	0.13534	0.10072	0.09909	0.08073	0.06058
40	0.31390	0.23286	0.18182	0.15417	0.14036	0.13413	0.12530	0.10072	0.09311	0.07057	0.03901
45	0.30589	0.21487	0.15693	0.12720	0.11803	0.10976	0.10134	0.09113	0.07804	0.06036	0.03687
50	0.29483	0.19601	0.13051	0.09760	0.09281	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
55	0.28000	0.17544	0.10155	0.06516	0.06490	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
60	0.26118	0.15309	0.06978	0.02989	0.03440	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
65	0.23879	0.12934	0.03574	0.00004	0.00182	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
70	0.20897	0.10078	0.00000	0.00004	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

SALARY INCREASE RATES: The following salary increase rates are used. Inflation rate of 2.50% plus productivity component of 1.00% plus step-rate/promotional component as shown:

Pay Increase Assumption	
Years of Service	Total Increase (Next Year)
1	4.75%
2	4.75
3	4.75
4	4.75
5	4.65
6	4.40
7	4.40
8	4.40
9	4.40
10 - 19	4.00
20 or more	3.50



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

LOCALS – TOP 10, LEO

Plan Specific Assumptions and Methods

MORTALITY RATES:

Pre-Retirement:

RP-2014 Employee Rates to age 80, Healthy Annuitant Rates at ages 81 and older projected with scale BB to 2020; males 90% of rates; females set forward 1 year

Post-Retirement:

RP-2014 Employee Rates to age 49, Healthy Annuitant Rates at ages 50 and older projected with scale BB to 2020; males set forward 1 year, 1% increase compounded from ages 70 to 90; females set forward 3 years

Post-Disablement:

RP-2014 Disabled Mortality Rates projected with scale BB to 2020; males set forward 2 years; unisex using 100% male

Top 10 LEO Mortality Rates						
Age	Male			Female		
	Pre Retirement	Post Retirement	Post Disablement	Pre Retirement	Post Retirement	Post Disablement
20	0.00036	0.00044	0.00839	0.00016	0.00016	0.00839
25	0.00043	0.00045	0.00772	0.00018	0.00019	0.00772
30	0.00040	0.00046	0.00820	0.00023	0.00025	0.00820
35	0.00046	0.00053	0.00948	0.00030	0.00033	0.00948
40	0.00056	0.00066	0.01247	0.00043	0.00052	0.01247
45	0.00086	0.00107	0.01810	0.00072	0.00089	0.01810
50	0.00149	0.00431	0.02124	0.00118	0.00317	0.02124
55	0.00246	0.00599	0.02397	0.00174	0.00423	0.02397
60	0.00405	0.00789	0.02682	0.00247	0.00625	0.02682
65	0.00693	0.01102	0.03182	0.00383	0.00989	0.03182
70	0.01139	0.01694	0.04125	0.00653	0.01601	0.04125
75		0.02871	0.05658		0.02631	0.05658
80		0.05074	0.08141		0.04493	0.08141
85		0.09286	0.12299		0.07928	0.12299
90		0.17558	0.19143		0.14077	0.19143

Mortality improvement is anticipated under the post-retirement mortality assumption as projected with Scale BB.



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

RETIREMENT RATES: The following rates of retirement are assumed for members eligible to retire.

Top 10 LEO Retirement Rates, Male					
Age	Years of service				
	0-4	5	6-24	25	>=26
<=49	0.000	0.000	0.000	0.000	0.000
50	0.000	0.070	0.070	0.260	0.260
51	0.000	0.070	0.060	0.150	0.205
52	0.000	0.070	0.060	0.150	0.205
53	0.000	0.070	0.060	0.150	0.205
54	0.000	0.070	0.060	0.150	0.205
55	0.000	0.070	0.060	0.150	0.205
56	0.000	0.070	0.060	0.210	0.205
57	0.000	0.070	0.060	0.210	0.205
58	0.000	0.070	0.060	0.210	0.205
59	0.000	0.070	0.125	0.320	0.275
60	0.000	0.210	0.210	0.210	0.275
61	0.000	0.375	0.275	0.275	0.275
62	0.000	0.500	0.320	0.320	0.320
63	0.000	0.500	0.320	0.320	0.320
64	0.000	0.500	0.400	0.400	0.400
>=65	0.000	1.000	1.000	1.000	1.000



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

Top 10 LEO Retirement Rates, Female					
Age	Years of service				
	0-4	5	6-24	25	>=26
<=49	0.000	0.000	0.000	0.000	0.000
50	0.000	0.050	0.050	0.320	0.320
51	0.000	0.050	0.088	0.250	0.200
52	0.000	0.050	0.075	0.250	0.200
53	0.000	0.050	0.075	0.250	0.275
54	0.000	0.050	0.075	0.250	0.275
55	0.000	0.050	0.075	0.250	0.210
56	0.000	0.050	0.140	0.250	0.210
57	0.000	0.050	0.140	0.250	0.210
58	0.000	0.050	0.140	0.250	0.210
59	0.000	0.050	0.140	0.250	0.400
60	0.000	0.200	0.200	0.200	0.400
61	0.000	0.200	0.200	0.200	0.200
62	0.000	0.200	0.350	0.350	0.350
63	0.000	0.200	0.300	0.300	0.300
64	0.000	0.200	0.300	0.300	0.300
>=65	0.000	1.000	1.000	1.000	1.000



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

DISABILITY RATES: As shown below for selected ages.

Top 10 LEO Disability Rates		
Age	Male	Female
20	0.00019	0.00012
25	0.00022	0.00248
30	0.00052	0.00558
35	0.00133	0.00705
40	0.00267	0.00794
45	0.00405	0.00906
50	0.00500	0.01090
55	0.00657	0.01376
60	0.01055	0.01788
65	0.01786	0.02327
70	0.03085	0.03105

TERMINATION RATES: The following are sample withdrawal rates based on age and years of service (for causes other than death, disability, or retirement).

Top 10 LEO Termination Rates		
Service	Male	Female
0	0.10000	0.15000
1	0.08500	0.09000
2	0.08000	0.09000
3	0.07500	0.09000
4	0.05500	0.09000
5	0.05000	0.09000
6	0.04750	0.09000
7	0.04500	0.06000
8	0.04000	0.03500
9	0.03000	0.02000
>=10	0.01800	0.02000



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

SALARY INCREASE RATES: The following salary increase rates are used. Inflation rate of 2.50% plus productivity component of 1.00% plus step-rate/promotional component as shown:

Pay Increase Assumption	
Years of Service	Total Increase (Next Year)
1	4.75%
2	4.75
3	4.75
4	4.75
5	4.65
6	4.40
7	4.40
8	4.40
9	4.40
10 - 19	4.00
20 or more	3.50

As Top 10 includes volunteers, the Entry Age Normal (Level Percent of Pay) actuarial cost method assumes an initial pay of \$1 for volunteers that increases annually by the assumed rate of inflation, 2.50%.



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

LOCALS – NON-TOP 10, LEO

Plan Specific Assumptions and Methods

MORTALITY RATES:

Pre-Retirement:

RP-2014 Employee Rates to age 80, Healthy Annuitant Rates at ages 81 and older projected with scale BB to 2020; males 90% of rates; females set forward 1 year

Post-Retirement:

RP-2014 Employee Rates to age 49, Healthy Annuitant Rates at ages 50 and older projected with scale BB to 2020; males set forward 1 year, 1% increase compounded from ages 70 to 90; females set forward 3 years

Post-Disablement:

RP-2014 Disabled Mortality Rates projected with scale BB to 2020; males set forward 2 years; unisex using 100% male

Non-Top 10 LEO Mortality Rates						
Age	Male			Female		
	Pre Retirement	Post Retirement	Post Disablement	Pre Retirement	Post Retirement	Post Disablement
20	0.00036	0.00044	0.00839	0.00016	0.00016	0.00839
25	0.00043	0.00045	0.00772	0.00018	0.00019	0.00772
30	0.00040	0.00046	0.00820	0.00023	0.00025	0.00820
35	0.00046	0.00053	0.00948	0.00030	0.00033	0.00948
40	0.00056	0.00066	0.01247	0.00043	0.00052	0.01247
45	0.00086	0.00107	0.01810	0.00072	0.00089	0.01810
50	0.00149	0.00431	0.02124	0.00118	0.00317	0.02124
55	0.00246	0.00599	0.02397	0.00174	0.00423	0.02397
60	0.00405	0.00789	0.02682	0.00247	0.00625	0.02682
65	0.00693	0.01102	0.03182	0.00383	0.00989	0.03182
70	0.01139	0.01694	0.04125	0.00653	0.01601	0.04125
75		0.02871	0.05658		0.02631	0.05658
80		0.05074	0.08141		0.04493	0.08141
85		0.09286	0.12299		0.07928	0.12299
90		0.17558	0.19143		0.14077	0.19143

. Mortality improvement is anticipated under the post-retirement mortality assumption as projected with Scale BB.



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

RETIREMENT RATES: The following rates of retirement are assumed for members eligible to retire.

Non-Top 10 LEO Retirement Rates, Male					
Age	Years of service				
	0-4	5	6-24	25	>=26
<=49	0.000	0.000	0.000	0.000	0.000
50	0.000	0.090	0.090	0.275	0.275
51	0.000	0.090	0.075	0.275	0.150
52	0.000	0.090	0.075	0.200	0.150
53	0.000	0.090	0.075	0.200	0.150
54	0.000	0.090	0.075	0.200	0.150
55	0.000	0.090	0.075	0.200	0.180
56	0.000	0.090	0.075	0.200	0.165
57	0.000	0.090	0.075	0.200	0.165
58	0.000	0.090	0.080	0.200	0.165
59	0.000	0.090	0.120	0.200	0.240
60	0.000	0.150	0.150	0.150	0.275
61	0.000	0.150	0.275	0.275	0.275
62	0.000	0.150	0.275	0.275	0.275
63	0.000	0.250	0.300	0.300	0.300
64	0.000	0.200	0.300	0.300	0.300
>=65	0.000	1.000	1.000	1.000	1.000



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

Non-Top 10 LEO Retirement Rates, Female					
Age	Years of service				
	0-4	5	6-24	25	>=26
<=49	0.000	0.000	0.000	0.000	0.000
50	0.000	0.093	0.093	0.500	0.500
51	0.000	0.125	0.090	0.200	0.150
52	0.000	0.125	0.090	0.200	0.150
53	0.000	0.125	0.090	0.200	0.150
54	0.000	0.125	0.090	0.200	0.150
55	0.000	0.125	0.090	0.200	0.180
56	0.000	0.125	0.090	0.200	0.165
57	0.000	0.125	0.090	0.200	0.165
58	0.000	0.125	0.090	0.200	0.165
59	0.000	0.125	0.090	0.200	0.240
60	0.000	0.200	0.200	0.200	0.275
61	0.000	0.200	0.275	0.275	0.275
62	0.000	0.200	0.275	0.275	0.275
63	0.000	0.200	0.300	0.300	0.300
64	0.000	0.200	0.300	0.300	0.300
>=65	0.000	1.000	1.000	1.000	1.000



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

DISABILITY RATES: As shown below for selected ages.

Non-Top 10 LEO Disability Rates		
Age	Male	Female
20	0.00001	0.00005
25	0.00016	0.00067
30	0.00058	0.00157
35	0.00121	0.00189
40	0.00218	0.00201
45	0.00330	0.00244
50	0.00416	0.00413
55	0.00496	0.00831
60	0.00575	0.01605
65	0.00630	0.02747
70	0.00659	0.04509



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

TERMINATION RATES: The following are sample withdrawal rates based on age and years of

Non-Top 10 LEO Termination Rates, Male											
Age	Years of Service										
	0	1	2	3	4	5	6	7	8	9	≥10
20	0.16820	0.15769	0.15265	0.14807	0.13578	0.11182	0.08845	0.07768	0.06899	0.06899	0.06899
25	0.16006	0.14519	0.13807	0.13247	0.12169	0.10519	0.08845	0.07768	0.06899	0.06899	0.06899
30	0.15408	0.13212	0.12044	0.11255	0.10382	0.09687	0.08803	0.07768	0.06849	0.06237	0.05800
35	0.15310	0.12574	0.10924	0.09896	0.09156	0.08897	0.08437	0.07640	0.06609	0.05433	0.04189
40	0.15357	0.12180	0.10118	0.08908	0.08281	0.08025	0.07719	0.07142	0.06199	0.04868	0.03220
45	0.15275	0.11790	0.09478	0.08223	0.07802	0.07022	0.06634	0.06269	0.05626	0.04561	0.03022
50	0.14879	0.11257	0.08908	0.07811	0.07733	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
55	0.14065	0.10547	0.08414	0.07694	0.07694	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
60	0.12791	0.09675	0.08028	0.07694	0.07694	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
65	0.11088	0.08665	0.07763	0.07694	0.07694	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
70	0.08616	0.07353	0.07353	0.07353	0.07353	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Non-Top 10 LEO Termination Rates, Female											
Age	Years of Service										
	0	1	2	3	4	5	6	7	8	9	≥10
20	0.17536	0.15011	0.12899	0.11652	0.11390	0.11329	0.11233	0.09556	0.06591	0.05831	0.05831
25	0.18762	0.15474	0.13049	0.11598	0.11001	0.10648	0.10224	0.08766	0.06591	0.05831	0.05831
30	0.20549	0.16296	0.13433	0.11683	0.10644	0.09874	0.09030	0.07873	0.06591	0.05831	0.05762
35	0.20886	0.16395	0.13402	0.11544	0.10335	0.09327	0.08334	0.07404	0.06591	0.05831	0.05043
40	0.20126	0.15881	0.13026	0.11258	0.10087	0.08968	0.08014	0.07253	0.06591	0.05763	0.04252
45	0.18253	0.14688	0.12276	0.10843	0.09904	0.08818	0.07992	0.07253	0.06587	0.05314	0.03443
50	0.15288	0.12797	0.11154	0.10319	0.09757	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
55	0.11234	0.10212	0.09680	0.09680	0.09599	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
60	0.06089	0.06935	0.06935	0.06935	0.06935	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
65	0.01269	0.03040	0.03040	0.03040	0.03040	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
70	0.01269	0.01185	0.01185	0.01185	0.01185	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000



Schedule B – Outline of Actuarial Assumptions and Methods (continued)

SALARY INCREASE RATES: The following salary increase rates are used. Inflation rate of 2.50% plus productivity component of 1.00% plus step-rate/promotional component as shown:

Pay Increase Assumption	
Years of Service	Total Increase (Next Year)
1	4.75%
2	4.75
3	4.75
4	4.75
5	4.65
6	4.40
7	4.40
8	4.40
9	4.40
10 - 19	4.00
20 or more	3.50

As Non-Top 10 includes volunteers, the Entry Age Normal (Level Percent of Pay) actuarial cost method assumes an initial pay of \$1 for volunteers that increases annually by the assumed rate of inflation, 2.50%.



Schedule C – Actuarial Cost Method

The Plan's valuation is prepared on the projected benefit basis, which is used to determine the present value of each member's expected benefit payable at disability or death. The calculations are based on the member's age, years of service, gender, and an assumed future interest earnings rate (currently 4.75%). The calculations consider the probability of a member's death, retirement, or termination of employment prior to becoming eligible for a benefit. The present value of the expected benefits payable to active members is added to the present value of the expected future payments to current benefit recipients to obtain the present value of all expected benefits payable to the present group of members.

The employer contributions required to support the benefits of the Line of Duty Act Fund consist of a normal contribution and an accrued liability contribution.

The normal contribution is determined using the "entry age normal" method (EAN). Under this method, a calculation is made for postemployment benefits to determine the uniform and constant percentage rate of employer contribution that, if applied to the compensation of the average new member during the entire period of his anticipated covered service, would be required to meet the cost of all benefits payable on a member's behalf. As the valuation includes volunteers, the cost method assumes an initial pay of \$1 for volunteers that increases annually by the assumed rate of inflation, 2.50%. Additionally, the normal contribution includes annual administrative expenses and the annual cost of benefits incurred and reported to the administrator but awaiting processing.

The unfunded accrued liability for the Plan is determined by subtracting the current assets from the liability of active employees and current recipients. The accrued liability contribution amortizes the balance of the unfunded accrued liability over a period of 30 years from the valuation date.



Schedule D – Summary of Main Plan Provisions as Interpreted for Valuation Purposes

Participating Employers

Any employer that is a state agency (i.e., employs a State Employee) participates in the Plan. Participating political subdivision employer groups with participants in the LODA Program were required to make an irrevocable election to participate in the Plan on or before July 1, 2012. Political subdivision employer groups who elected to opt-out of the Plan and self-fund LODA Program benefits assume responsibility for all benefit payments made after the election. This includes amounts paid to current beneficiaries for whom the political subdivision employer group is the employer of record.

Eligibility

Hazardous duty state and local government employees of the following groups, including volunteers, are eligible for the LODA Program benefits.

- Law-enforcement officers of the Commonwealth or any of its political subdivisions
- Correctional officers
- Jail officers
- Regional jail or jail farm superintendents
- Sheriff, deputy sheriff, city sergeant, or deputy city sergeant of the City of Richmond
- Police chaplains
- Members of fire companies or departments or rescue squads recognized by any county, city, or town of the Commonwealth as an integral part of an official safety program
- Virginia National Guard or the Virginia State Defense Force members, including fire companies or departments providing their fire protection services
- Special agents of the Virginia Alcoholic Beverage Control Board
- Full-time sworn members of the enforcement division of the Department of Motor Vehicles
- Conservation officers of the Department of Conservation and Recreation.
- Commissioned forest wardens
- Members or employees of the Virginia Marine Resources Commission granted the power of arrest
- Department of Emergency Management hazardous materials officers
- Other employees of the Department of Emergency Management if performing duties related to a major disaster or emergency
- Employees of any county, city, or town performing official emergency management or emergency services duties in cooperation with the Department of Emergency Management
- Non-firefighter regional hazardous materials emergency response team members

Some of those covered by the Plan may not be able to be identified in a census (e.g., volunteers) or, if they can be specifically identified, may not have a level of exposure that is on par with other participants (e.g., those serving in a major disaster or emergency versus a full-time firefighter). Experience, if and when available, would be the best method to determine the appropriate "load" to the seriatim liability. The results presented assume no additional margin for unidentifiable employees.

The results provided do not account for the potential, long-term incurred but not reported claims resulting from a lack of employer or beneficiary education about the Plan's benefits. The potential cost and liability for these claims may be considerable. A margin for these costs may need to be considered as experience develops.



Schedule D – Summary of Main Plan Provisions as Interpreted for Valuation Purposes (continued)

The results presented were determined based upon the demographic assumptions (e.g., mortality, disability, retirement, termination) of state employee and law enforcement/fire personnel covered by VRS, and, as such, may not reflect the experience of all participants. If credible experience materializes, the Plan may want to consider developing rates based upon segmented risk pools or other divisions.

Death Benefit

A \$100,000 death benefit payment for death occurring as a direct or proximate result of the performance of duty, or a \$25,000 death benefit payment for death by presumptive clause or within five years of retirement. In determining the average death benefit payment, the LODA Program's experience was used to develop an average benefit payment assumption, reflecting the benefit's varying amount based upon the cause of death, and applied to a percentage of active mortality. Presumptive death benefit payments require additional investigation to determine employee status at the time of death.

Health Care Coverage Period

For disabilities and deaths occurring prior to July 1, 2017 that result in health care coverage under the Plan, disabled employees, their spouses, and surviving spouses receive lifetime health care benefits. For disabilities and deaths occurring after June 30, 2017 that result in health care coverage under the Plan, disabled employees (except those eligible for Medicare due to disability under Social Security Disability Insurance or a Railroad Retirement Board Disability Annuity), their spouses, and surviving spouses receive health care benefits until becoming eligible for Medicare due to age (age 65). Disabled employees eligible for Medicare due to disability under Social Security Disability Insurance or a Railroad Retirement Board Disability Annuity receive lifetime health care benefits.

Health Care Benefit (Effective July 1, 2017)

The health care benefit for the LODA Program is provided through the LODA Health Benefits Plans, administered by the Department of Human Resource Management and modeled upon the state employee health benefits program plans (COVA Care). As the cost of the LODA Health Benefits Plans is to be pooled across all beneficiaries of the LODA Program, the cost to the Plan may be higher or lower than the actual health care costs incurred by the Plan's health care beneficiaries.

Per capita costs were based upon the adjusted experience of those State Employees currently receiving health care benefits from the Plan using high-level assumptions and estimates that are likely to change as details regarding the LODA Health Benefit Plans emerge. This includes the demographic adjustments made for the Plan's covered population, the mix of health care plan and coverage elections made by State Employees, and the level of benefits to be provided. As such, future experience may differ significantly from the cost estimates presented in this report, and the valuation's results should be viewed as having a likely range of variability.

Beyond the first projection year, all assumed health care costs not related to covered dependent children were age-adjusted to reflect the full, age-specific cost of providing benefits.



Schedule D – Summary of Main Plan Provisions as Interpreted for Valuation Purposes (continued)

Cost Offsets

To the extent the Plan's benefits are paid or reimbursed by other programs such as the VRS Health Insurance Credit Program (HIC), or applicable retirement plans, benefit offsets should be considered in developing the Plan's rate structure. The results provided include estimated HIC receipts and assume the estimated reimbursements from the HIC program are used to decrease costs for all Plan participants.

Affordable Care Act

The impact of the Affordable Care Act (ACA) was addressed in this valuation. While the impact of certain provisions should be recognized in the determination of liabilities, overall future plan costs and the resulting liabilities are driven by amounts employers and retirees can afford (i.e., trend). Given the uncertainty regarding the ACA's implementation, continued monitoring of the ACA's impact on the Plan's liability will be required.



Schedule E – Schedule of Active Member Data

**SCHEDULE OF FULL TIME ACTIVE MEMBER DATA
AS OF JUNE 30, 2019**

Attained Age	Years of Service to Valuation Date									Total
	Less than 1 Year	1-4	5-9	10-14	15 - 19	20 - 24	25 - 29	30 - 34	35 or more	
Under 25	782	437	0	0	0	0	0	0	0	1,219
25 - 29	0	2,499	175	0	0	0	0	0	0	2,674
30 - 34	0	543	1,846	174	1	0	0	0	0	2,564
35 - 39	0	56	1,207	926	142	2	0	0	0	2,333
40 - 44	0	36	81	1,676	353	115	1	0	0	2,262
45 - 49	0	28	81	712	1,264	381	89	3	0	2,558
50 - 54	0	27	44	101	1,362	160	180	98	0	1,972
55 - 59	0	12	40	69	969	69	69	118	38	1,384
60 - 64	0	5	14	22	27	453	24	30	84	659
65 - 69	0	1	6	7	6	110	2	8	33	173
70 & Up	0	0	0	2	0	25	1	0	3	31
Total	782	3,644	3,494	3,689	4,124	1,315	366	257	158	17,829