



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, 2021





Cavanaugh Macdonald

CONSULTING, LLC

The experience and dedication you deserve

January 18, 2022

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, 2021.

The purpose of this report is to show the Pay-As-You-Go rate based on the June 30, 2021 valuation data, which will be used for fiscal years 2023 and 2024, and to show the adjusted Board approved Pay-As-You-Go rate of contribution based on the June 30, 2019 valuation, which is used for fiscal year 2022. This report also calculates an Actuarially Determined Employer Contribution Rate (ADEC) to be used for GASB 74 purposes. In addition, we prepared the underlying schedules from which the selected information in the annual report was extracted.

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, as well as the inclusion of additional presumptions as added by the passage of various legislative bills. 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 LODA members currently receiving health care benefits from the Plan.



The Board of Trustees
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Contribution rates for participating employer groups are established every two years. Based upon the June 30, 2019 valuation results, the initial Board approved rate for fiscal years 2021 and 2022 was \$695.18 which was later adjusted to \$717.31 for fiscal year 2021 and \$722.55 for fiscal year 2022. More detail regarding the adjustments can be found on page one of this report. The Board approved rate of \$681.84 for fiscal years 2023 and 2024 is based upon the most recent valuation of June 30, 2021. The results of the June 30, 2020 valuation are for informational purposes only. The June 30, 2021 contribution rates assume Plan participation of 11,373.20 State Employee FTEs and 7,714.00 Political Subdivision Employee FTEs, for a total of 19,087.20 FTEs.

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 LODA Fund is invested in the same manner as the pension funds, the valuation results provided in this report reflect a discount rate of 6.75%. 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 as well as changes in the actuarial assumptions recommended in the experience study for the four-year period ending June 30, 2020 and adopted by the Board at its April 20, 2021 meeting. The impact of the COVID-19 pandemic was considered in this valuation; however, no explicit changes were incorporated at this time other than the inclusion of COVID-19 as a presumption for certain members due to House Bills 1985 and 2207 (HB 1985, HB 2207). Given the uncertainty regarding COVID-19 (e.g., the impact of routine care being deferred, direct COVID-19 treatment and prevention costs, changes in contribution and budget projections), continued monitoring of the impact on the Plan's liability will be required.

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 for funding purposes with assumptions and methods that meet the parameters of the Actuarial Standards of Practice, 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.



The Board of Trustees
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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

In order to prepare the results in this report we have utilized appropriate actuarial models that were developed for this purpose. These models use assumptions about future contingent events along with recognized actuarial approaches to develop the needed results.

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 'LL'.

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, EA, FCA, MAAA
Senior Actuary

AB/LL/BRW:jf



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Section I – Summary of Principal Results

Introduction and Summary

This report contains the actuarial valuation results as of June 30, 2021 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

LODA Premiums for FY 2021 and 2022

Odd year valuations are for rate setting; even year valuations are for informational purposes.

- FY 2021 and 2022 rate based on the June 30, 2019 valuation was initially \$695.18 per FTE.
- State legislature modified the FY 2021 rate to \$717.31 to cover new legislation enacted effective July 1, 2020.
- State legislature further modified the FY 2022 rate to \$722.55 to cover new legislation enacted effective July 1, 2021.

LODA Premiums for FY 2021 and 2022	
	Premium Per FTE
Result of 6/30/2019 Valuation – Board Certified Rate	\$695.18
Include Natural or Adopted Children Who Were Previously Covered	\$14.03
Correctional Officers & DMV Infectious Diseases	\$1.25
Add Cancers of Colon, Brain, or Testes	\$6.85
Add Post-Traumatic Stress Disorder	No immediate increase determined
Adjusted LODA Premium Rate (FY 2021)	\$717.31
Add Hypertension and Heart Disease Presumptions for Eligible EMS Personnel and Add COVID-19 as Workers' Compensation	\$5.24
Adjusted LODA Premium Rate (FY 2022)	\$722.55

LODA Premiums for FY 2023 and 2024

The June 30, 2021 valuation is used to set contribution rates for fiscal years 2023 and 2024.

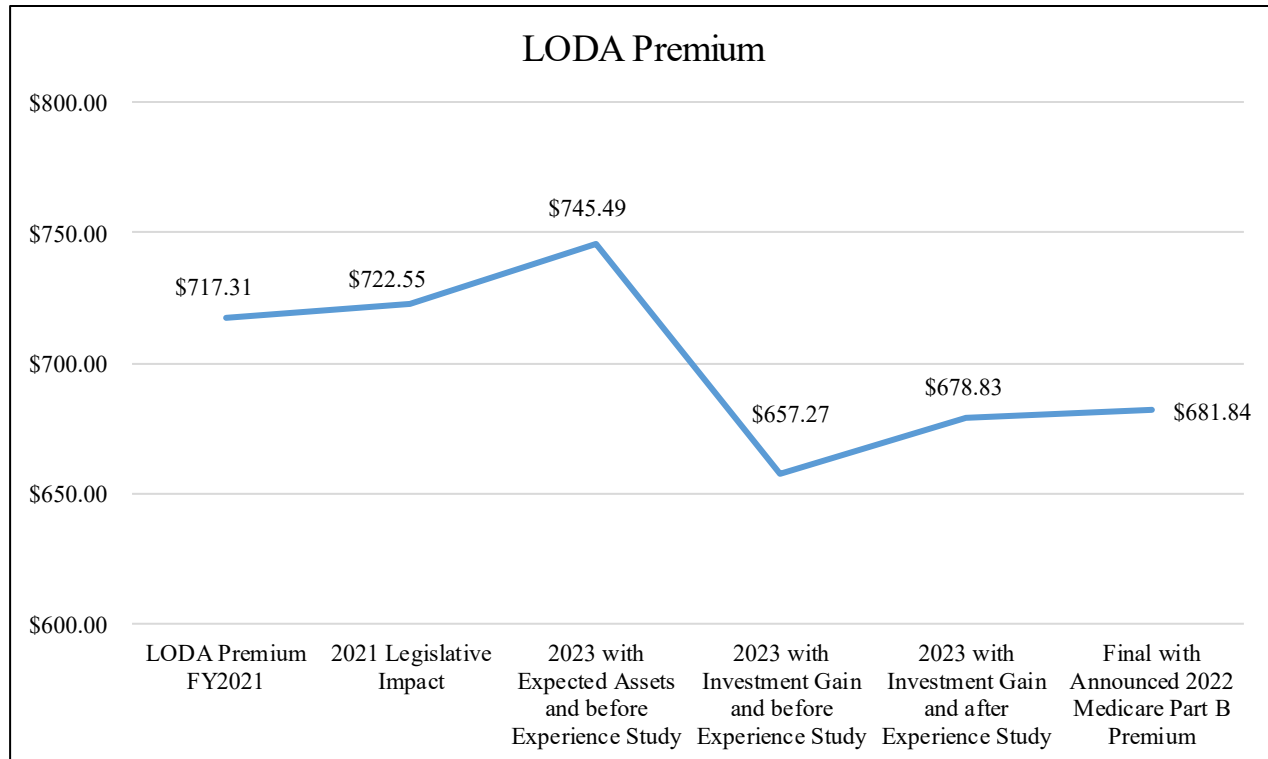
- New (FY 2023 and 2024) rate is \$681.84 per FTE

LODA Premiums for FY 2023 and 2024	
	Premium Per FTE
Result of 6/30/2021 Valuation – Board Certified Rate	\$681.84



Section I – Summary of Principal Results (continued)

Change in LODA Premium Since FY2021



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. LODA fund assets are expected to earn 6.75%. 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.
- Health care premium rates.
- Actuarial assumptions for:
 - Health care trend.
 - 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.



Section I – Summary of Principal Results (continued)

Administrative Expenses

- Assumed to be \$565,000 for fiscal year 2022 with 3.00% increases in the future.

LODA Fund contributions are likely to increase annually because:

- The plan is funded on a current disbursement basis (no advance-funding).
- The plan is funded on a dollar per FTE employee contribution basis.
- Health costs will increase with health care inflation (increasing cost basis).
- Over time, there will be an increasing number of beneficiaries that are funded by a static FTE employee count.

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. 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, 2021 valuation, the actuarial assumptions were revised to reflect the results of the experience study for the period 2016 – 2020. The next experience review is expected to be implemented with the June 30, 2025 annual valuation. Liabilities for the ADEC were determined under the Entry Age Normal actuarial cost method.



Section I – Summary of Principal Results (continued)

Changes to the actuarial assumptions as a result of the experience study for the four-year period ending June 30, 2020 are summarized below.

System	Assumption	Description
State	1. Mortality Rates (Pre-retirement, post-retirement healthy and disabled)	Updated to PUB2010 public sector mortality tables. For future mortality improvements, replace load with a modified Mortality Improvement Scale MP-2020.
	2. Retirement Rates	Adjusted rates to better fit experience for Plan 1; set separate rates based on experience for Plan 2/Hybrid; changed final retirement age from 75 to 80 for all
	3. Withdrawal Rates	Adjusted rates to better fit experience at each age and service decrement through 9 years of service
	4. Disability Rates	No change
	5. Salary Increases	No change
	6. Line of Duty Disability	No change
SPORS	1. Mortality Rates (Pre-retirement, post-retirement healthy and disabled)	Updated to PUB2010 public sector mortality tables. Increased disability life expectancy. For future mortality improvements, replace load with a modified Mortality Improvement Scale MP-2020.
	2. Retirement Rates	Increased rates for ages 55 to 61, 63, and 64 with 26 or more years of service; changed final retirement age from 65 to 70
	3. Withdrawal Rates	Decreased rate for 0 years of service and increased rates for 1 to 6 years of service
	4. Disability Rates	No change
	5. Salary Increases	No change
	6. Line of Duty Disability	No change
VaLORS	1. Mortality Rates (Pre-retirement, post-retirement healthy and disabled)	Updated to PUB2010 public sector mortality tables. Increased disability life expectancy. For future mortality improvements, replace load with a modified Mortality Improvement Scale MP-2020.
	2. Retirement Rates	Increase rates at some younger ages, decreased at age 62, and changed final retirement age from 65 to 70
	3. Withdrawal Rates	Adjusted rates to better fit experience at each age and service decrement through 9 years of service
	4. Disability Rates	No change
	5. Salary Increases	No change
	6. Line of Duty Disability	No change
Locals Top-10 (Hazardous Duty)	1. Mortality Rates (Pre-retirement, post-retirement healthy and disabled)	Updated to PUB2010 public sector mortality tables. Increased disability life expectancy. For future mortality improvements, replace load with a modified Mortality Improvement Scale MP-2020.
	2. Retirement Rates	Adjusted rates to better fit experience and changed final retirement age from 65 to 70
	3. Withdrawal Rates	Decreased rates
	4. Disability Rates	No change
	5. Salary Increases	No change
	6. Line of Duty Disability	No change



Section I – Summary of Principal Results (continued)

System	Assumption	Description
Locals Non-Top 10 (Hazardous Duty)	1. Mortality Rates (Pre-retirement, post-retirement healthy and disabled)	Updated to PUB2010 public sector mortality tables. Increased disability life expectancy. For future mortality improvements, replace load with a modified Mortality Improvement Scale MP-2020.
	2. Retirement Rates	Adjusted rates to better fit experience and changed final retirement age from 65 to 70
	3. Withdrawal Rates	Decreased rates and changed from rates based on age and service to rates based on service only to better fit experience and to be more consistent with Locals Top-10 Hazardous Duty
	4. Disability Rates	No change
	5. Salary Increases	No change
	6. Line of Duty Disability	No change
LODA	1. Discount rate for funding	Adjusted to 6.75% since assets are invested in same manner as the pension plan assets
	2. Percentage of disabilities qualifying for benefits	Increased based on available data and considering pension assumptions. Includes margin for presumptions to be added as well as any future COVID-19 impact on disabilities.
	3. Percentage of qualifying deaths that are a direct result of the performance of duty	Increased to 50% based on available data
	4. Spouse participation rates	Increased to 80% of disabilities and 80% of deaths result in spouse coverage

Benefit Provisions

This actuarial valuation takes into account the provisions of VRS as of the valuation date. Changes associated with HB 51 (2020), HB 169 (2020), HB 783 (2020), and HB 438 (2020) modified the pay-as-you-go rate from \$695.18 to \$717.31 per FTE employees for the fiscal year ending June 30, 2021. Changes associated with HB 1818 (2021), HB 1985 (2021), and HB 2207 (2020) modified the pay-as-you-go rate from \$717.31 to \$722.55 per FTE employees for the fiscal year ending June 30, 2022. All of these changes are incorporated in the current valuation as of June 30, 2021. 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 table on the following page with additional information provided in Section II and Schedule E.

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, 2021, which means the unfunded actuarial accrued liability was lower than anticipated. The major factor in the gain was the increase in the discount rate based on the new experience study along with investment returns greater than expected. In addition, there was an actuarial experience gain due to demographic experience and a small gain due to health care premium cost experience. Offsetting these gains were losses due to increases in the assumed percentage of deaths and disabilities qualifying for LODA benefits and in assumed spouse coverage due to the experience study.



Section I – Summary of Principal Results (continued)

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. Cash flow projections simulate future financial results over a forecast period by projecting future benefit payments and employer contributions based on the assumptions regarding deaths, disabilities, terminations and retirements of the current population over time, while assuming a static active population. In addition, the following items are assumed for the projected results provided in this section of the report:

- Adjusted Board approved contributions of \$722.55 per FTE employee are made to the LODA Fund for the fiscal year ending June 30, 2022.
- Board approved contributions of \$681.84 per FTE employee are made to the LODA Fund for the fiscal years ending June 30, 2023 and June 30, 2024.
- 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.



Section I – Summary of Principal Results (continued)

Cash Flow Based on Board Approved Pay-As-You-Go Rates

The chart below shows the projected costs and contributions on a pay-as-you-go basis, assuming a level FTE headcount and the Board approved pay-as-you-go rates. Benefit costs, administrative expenses and investment expenses are projected through the end of each two-year period. Employer contributions are calculated as the amount that would allow assets to be sufficient to pay costs for each two-year period and be depleted as of the end of each two-year period.

**CASH FLOW PROJECTIONS
Based on Actual and Projected Board Approved Rates in Odd Rate Setting Years
(Actual Cash Flow Projection)**

All Participating Employer Groups - June 30, 2021 Valuation Basis								
	Actual	Projected						
	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028
FTE Employees	19,989.05	19,087.20	19,087.20	19,087.20	19,087.20	19,087.20	19,087.20	19,087.20
Cash Flow (Per FTE Employee)								
Employer Contribution Rate	\$717.31	\$722.55	\$681.84	\$681.84	\$1,057.92	\$1,057.92	\$1,228.64	\$1,228.64
Benefit Costs	(655.11)	(738.42)	(840.46)	(935.31)	(1,018.65)	(1,103.43)	(1,194.65)	(1,275.85)
Administrative Expenses	(49.00)	(29.60)	(30.49)	(31.38)	(32.33)	(33.32)	(34.32)	(35.36)
Investment Income and Misc. Rev	183.14	49.56	43.62	30.56	35.94	35.94	41.46	41.46
Net Cash Flow	196.34	4.09	(145.49)	(254.29)	42.88	(42.89)	41.13	(41.11)
Cash Flow								
Employer Contributions	\$13,632,927	\$13,791,456	\$13,014,453	\$13,014,453	\$20,192,792	\$20,192,792	\$23,451,235	\$23,451,235
Benefit Costs	(13,094,992)	(14,094,421)	(16,041,981)	(17,852,481)	(19,443,202)	(21,061,347)	(22,802,536)	(24,352,467)
Administrative Expenses	(979,427)	(565,000)	(582,000)	(599,000)	(617,000)	(636,000)	(655,000)	(675,000)
Investment Income and Misc. Rev	3,660,865	945,975	832,489	583,360	685,982	685,983	791,267	791,266
Net Cash Flow	\$3,219,373	\$78,010	(\$2,777,039)	(\$4,853,668)	\$818,572	(\$818,572)	\$784,966	(\$784,966)
End of Year Net Position	\$7,552,697	\$7,630,707	\$4,853,668	\$0	\$818,572	\$0	\$784,966	\$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, 2021	June 30, 2020
Number FTE Employees	19,087.20	19,989.05
Number Receiving Benefits	1,189.00	1,168.00
Total	20,276.20	21,157.05
Assets:		
Actuarial Value	\$ 7,553,000	\$ 4,333,000
Market Value	\$ 7,553,000	\$ 4,333,000
Total Actuarial Liability	255,264,578	295,454,950
Unfunded Actuarial Liability	247,711,578	291,121,950
Amortization Period (Years)	30	30
Annual Required Contribution (ARC) in Dollars:		
Normal Cost	\$ 18,767,471	\$ 14,043,822
Administrative Expenses	565,000	520,000
Accrued Liability	13,225,521	12,258,485
Total	\$ 32,557,992	\$ 26,822,307
Contribution Per FTE Employee		
Normal Cost	\$ 983.25	\$ 702.58
Administrative Expenses	29.60	26.01
Total Adjusted Normal Cost	\$ 1,012.85	\$ 728.59
Accrued Liability	692.90	613.26
Total ARC	\$ 1,705.75	\$ 1,341.85
Expected Benefits Paid*:		
Total	\$ 14,094,421	\$ 15,020,664
Per FTE Employee	\$ 738.42	\$ 751.44
Discount Rate	6.75 %	4.75 %

* Excludes administrative expenses and 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, 2021 indicates that the pay-as-you-go employer contribution rate per FTE is \$681.84 for fiscal years 2023 and 2024 and the Actuarially Determined Employer Contribution is \$1,705.75 per FTE employee payable for the fiscal year ending June 30, 2023.
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 Locals, and Non-Top 10 Locals. 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. Since the previous valuation, the health care trend assumption has been updated to reflect the most recent industry projections.
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:



Section I – Summary of Principal Results (continued)

- 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.
- 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, 2021 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 were included in the plan provisions and assumed to be included in the premium rates as of June 30, 2021 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 additional conditions as legislation is passed.



Section I – Summary of Principal Results (continued)

Changes associated with HB 51 (2020), HB 169 (2020), HB 783 (2020), HB 438 (2020), HB 1818 (2021), HB 1985 (2021), and HB 2207 (2021) modified the pay-as-you-go rate from \$695.18 to \$717.31 per FTE employee for the fiscal year ending June 30, 2021 and \$722.55 per FTE employee for the fiscal year ending June 30, 2022 and include the following. These changes are included in the June 30, 2021 valuation.

- Covers children born or adopted after date of death or disability but before July 1, 2017.
- Adds correctional officers and full-time sworn members of the enforcement division of DMV to presumption for infectious diseases.
- Adds brain, colon, and testicular cancers as presumptions for firefighters and certain employees. Also lowers service requirement for cancer presumptions to five years, removes the need for contact with a toxic substance, and adds a five-year service requirement for hypertension and heart disease presumptions. Effective for diagnoses after July 1, 2020.
- Makes salaried or volunteer emergency medical services personnel eligible for the hypertension or heart disease presumption. Prospective only. Effective July 1, 2021.
- Adds COVID-19 as a presumption for health care providers who as part of the provider's employment are directly involved in diagnosing or treating persons known or suspected to have COVID-19. For death or disability on or after March 12, 2020 through December 31, 2021.
- Adds COVID-19 as a presumption for firefighters, emergency medical services personnel, law-enforcement officers, correctional officers and regional jail officers. For death or disability on or after July 1, 2020 through December 31, 2021.



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)
- Law Enforcement, Firefighters and EMTs of associated participating political subdivisions
- Firefighter trainees enrolled in a Fire Service course offered by the Virginia Department of Fire Programs

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

Employer Group	Fiscal Year Ending 2020		Fiscal Year Ending 2021			FY 2022 Contributions*
	Employees	FTE Employees	Employees	Weight	FTE Employees	
State/VaLORS/SPORS	9,707	9,707.00	9,577	100%	9,577	\$ 6,919,861
National Guard						
Full-Time	1,873	1,873.00	1,044	100%	1,044.00	\$ 1,297,845
Part-Time	6,333	633.30	7,522	10%	752.20	
<i>Total State & National Guard Employees</i>	<i>17,913</i>	<i>12,213.30</i>	<i>18,143</i>		<i>11,373.20</i>	<i>\$ 8,217,706</i>
Participating Political Subdivisions						
Full-Time	7,171	7,171.00	7,106	100%	7,106.00	\$ 5,134,440
Volunteers	2,419	604.75	2,432	25%	608.00	\$ 439,310
<i>Total Political Subdivision Employees</i>	<i>9,590</i>	<i>7,775.75</i>	<i>9,538</i>		<i>7,714.00</i>	<i>\$ 5,573,750</i>
<i>Aggregated Total</i>	<i>27,503</i>	<i>19,989.05</i>	<i>27,681</i>		<i>19,087.20</i>	<i>\$ 13,791,456</i>

*FY 2022 contribution rate of \$722.55 per FTE employee based upon June 30, 2019 valuation including increases due to legislation

Based upon 27,681 total lives, the valuation provides results for a group comprised of 19,087.20 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, 2021 and for the prior valuation date of June 30, 2020.

NUMBER OF HEALTH CARE BENEFICIARIES

Participating Employer Groups as of June 30, 2021			
Beneficiary Type	State	Political Subdivisions	Aggregated Total
Disabled Participants	250	403	653
Spouses of Currently Disabled Participants	162	278	440
<u>Surviving Spouses</u>	<u>39</u>	<u>57</u>	<u>96</u>
Total	451	738	1,189

Participating Employer Groups as of June 30, 2020			
Beneficiary Type	State	Political Subdivisions	Aggregated Total
Disabled Participants	255	395	650
Spouses of Currently Disabled Participants	164	265	429
<u>Surviving Spouses</u>	<u>40</u>	<u>49</u>	<u>89</u>
Total	459	709	1,168

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
6/30/2021	37	883,704	16	80,976	1,189	12,332,496
6/30/2020	57	745,212	62	563,340	1,168	11,529,768
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, 2021, \$7,553,000 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, 2021	June 30, 2020
1. Funds available at beginning of year	\$ 4,333,000	\$ 2,839,000
Revenue for the year		
Employer contributions	\$ 13,633,000	\$ 13,567,000
Miscellaneous income (includes reimbursement for opt-out members)	629,000	581,000
Net investment income	3,031,000	347,000
2. Total revenue	\$ 17,293,000	\$ 14,495,000
Expenditures for the year		
Benefit payments	\$ 13,094,000	\$ 12,191,000
Administrative expenses (includes opt-out members)	979,000	810,000
Other expenses	0	0
3. Total expenditures	\$ 14,073,000	\$ 13,001,000
4. Revenue less expenditures (2) - (3)	\$ 3,220,000	\$ 1,494,000
5. Funds available at end of year (1) + (4)	\$ 7,553,000	\$ 4,333,000



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, 2021**

Group	Count
Active Members (FTE Employees)	19,087
Disabled Members	653
Spouses of Disabled Members	440
<u>Surviving Spouses</u>	<u>96</u>
Total	20,276

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)
6/30/2021	\$7,553	\$255,265	\$247,712	2.96%
6/30/2020	4,333	295,455	291,122	1.47
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, 2021. Additional information as of the latest actuarial valuation follows:

Valuation Date	June 30, 2021
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	6.75%
Includes Inflation at	2.50%
Medical Trend Assumption (Under Age 65)	7.00% - 4.75%
Medical Trend Assumption (Ages 65 and Older)	5.25% - 4.75%
Medicare Part B	6.971% - 4.75%
Year of Ultimate Trend Rate (Under Age 65)	Fiscal Year Ended 2030
Year of Ultimate Trend Rate (Ages 65 and Older)	Fiscal Year Ended 2024
Medicare Part B	Fiscal Year Ended 2031



Section V – Derivation of Experience Gains and Losses

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

Fiscal Year 2021	
1. Beginning of Year:	
(a) Actuarial Accrued Liability (AAL)	\$ 295.5
(b) Normal Cost	14.0
(c) Benefit Payments	13.1
2. End of Year:	
(a) Expected AAL	310.8
$[(1a) + (1b)] \times 1.0475 - [(1c) \times (1 + [0.0475 \times 0.50])]$	
(b) Actual AAL, with expected premiums	288.4
(c) Actual AAL, with actual premiums	285.9
(d) Actual AAL, after Experience Study at 4.75%	321.0
(e) Actual AAL, after Experience Study at 6.75%	255.3
3. Total AAL Gain (Loss)	
(a) Demographic Experience (2a) - (2b)	22.4
(b) Premium Experience (2b) - (2c)	2.5
(c) Assumption Changes (2c) - (2d)	(35.1)
(d) Discount Rate (2d) - (2e)	65.7
Total	55.5
4. Actuarial Value of Assets (AVA) Beginning of Year	4.3
5. Net External Cash Flow During the Year	
(a) Expected Contributions	26.3
(b) Actual Contributions	13.6
(c) Benefit Payments	13.1
6. End of Year:	
(a) Expected AVA with Expected Contributions	18.6
$[(4) + (5a)] \times 1.0475 - [(5c) \times (1 + [0.0475 \times 0.50])]$	
(b) Expected AVA with Actual Contributions	5.0
$[(4) \times 1.0475] + [(5b) - (5c)] \times (1 + [0.0475 \times 0.50])]$	
(c) Actual AVA	7.6
7. AVA Gain (Loss)	
(a) Investment Experience (6c) - (6b)	2.6
(b) Gain (Loss) due to Contribution Shortfall (6b) - (6a)	(13.6)
Total	(11.0)
8. Expected UAAL at End of Year	292.2
(2a) - (6a)	
9. Actual UAAL at End of Year	247.7
(2e) - (6c)	
10. UAAL Gain (Loss)	
(a) Experience (3a) + (3b) + (7a)	27.5
(b) Gain (Loss) due to Assumption Changes (3c) + (3d)	30.6
(c) Gain (Loss) due to Contribution Shortfall (7b)	(13.6)
Total	44.5



Schedule A – Results of the Valuation

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

	Valuation Date	
	June 30, 2021	June 30, 2020
1 NUMBER OF FTE EMPLOYEES	19,087.20	19,989.05
2 ACTUARIAL ACCRUED LIABILITY		
Present value of prospective benefits payable in respect of:		
(a) Present active members	\$191,933,921	\$188,972,264
(b) Present beneficiaries	<u>215,990,947</u>	<u>256,627,485</u>
(c) Total present value of prospective benefits	\$407,924,868	\$445,599,749
(d) Present value of future normal contributions	<u>152,660,290</u>	<u>150,144,799</u>
(e) Total actuarial accrued liability (2c) – (2d)	\$255,264,578	\$295,454,950
3 PRESENT ASSETS FOR VALUATION PURPOSES	\$ 7,553,000	4,333,000
4 UNFUNDED ACTUARIAL ACCRUED LIABILITY (2e) – (3)	\$247,711,578	\$291,121,950
5 NORMAL CONTRIBUTION	\$ 18,767,471	\$ 14,043,822
6 ADMINISTRATIVE EXPENSES	565,000	520,000
7 ACCRUED LIABILITY CONTRIBUTION	<u>13,225,521</u>	<u>12,258,485</u>
8 TOTAL CONTRIBUTION (5) + (6) + (7)	\$ 32,557,992	\$ 26,822,307
9 NORMAL CONTRIBUTION PER FTE EMPLOYEE (5) ÷ (1)	\$983.25	\$702.58
10 ADMINISTRATIVE EXPENSES PER FTE EMPLOYEE (6) ÷ (1)	29.60	26.01
11 ACCRUED LIABILITY CONTRIBUTION PER FTE EMPLOYEE (7) ÷ (1)	<u>692.90</u>	<u>613.26</u>
12 TOTAL CONTRIBUTION PER FTE EMPLOYEE (9) + (10) + (11)	\$1,705.75	\$1,341.85
13 AMORTIZATION PERIOD	30	30



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 Contributions	(2) Retirees, Survivors, and Inactive Members	(3) Active Members (Employer Financed Portion)	Total		(1)	(2)	(3)
6/30/2021	n/a	\$215,991	\$39,274	\$255,265	\$7,553	n/a	3.50%	0.00%
6/30/2020	n/a	256,627	38,828	295,455	4,333	n/a	1.69	0.00
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 valuation of the OPEB plans for VRS relies heavily on the assumptions used for pensions. The assumptions and methods used in the valuations were based on the results of an actuarial experience study for the period from July 1, 2016 through June 30, 2020 adopted by the Board of Trustees at its April 20, 2021 meeting as well as the investment rate of return of 6.75% adopted by the Board of Trustees at its October 10, 2019 meeting. For assumptions specific to OPEB benefits, the Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 6, “*Measuring Retiree Group Benefit Obligations*,” which provides guidance to actuaries in selecting economic, demographic, and coverage assumptions for measuring obligations of postemployment plans other than pensions. Additionally, ASOP No. 5, “*Incurred Health and Disability Claims*” and ASOP No. 18, “*Long-Term Care Insurance*” provide guidance. In our opinion, the OPEB specific assumptions recommended in this report have been developed in accordance with ASOPs No. 5, 6 and 18.

Investment Return Rate: 6.75% 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	25%
SPORS	85%
VaLORS	35%
Non-Top 10 LEOS	65%
Top 10 LEOS	70%



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

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

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	25%
SPORS	85%
VaLORS	35%
Non-Top 10 LEOS	45%
Top 10 LEOS	70%

Of the service-related deaths, 50% are assumed to be paid as a direct or proximate result of the performance of duty, with the remainder paid under the presumptive clause.

Plan 1: Members hired prior to July 1, 2010, and who were vested as of January 1, 2013.

Plan 2: Members hired on or after July 1, 2010, or members hired prior to July 1, 2010, and who were not vested as of January 1, 2013. Members hired after January 1, 2014, in the State Police and Virginia Law Officers Plans are in Plan 2.

Hybrid: Members hired on or after January 1, 2014, or by member election. There is no Hybrid Plan in the State Police and Virginia Law Officers Plans.

Eligibility: VRS State Plan 1 employees 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 Plan 2 or Hybrid employees 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. 80% 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 \$520,000 for fiscal year 2020 and \$565,000 for fiscal year 2021 with 3.00% increases in the future. Administrative expenses for the fund assume an offset of administrative fees collected from opt-out employers to process claims.



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

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

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. Actual HIC reimbursements for the current fiscal year are used to estimate future reimbursements.

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
2021	7.00%	5.250%
2022	6.75%	5.125%
2023	6.50%	5.000%
2024	6.25%	4.750%
2025	6.00%	4.750%
2026	5.75%	4.750%
2027	5.50%	4.750%
2028	5.25%	4.750%
2029	5.00%	4.750%
2030 and Beyond	4.75%	4.750%

Additionally, the following chart details the trend assumption for the Medicare Part B premium. The trend rate assumption is based on the 2021 Medicare Trustees Report.

Fiscal Year Ended	
2021	6.971%
2022	6.723%
2023	5.221%
2024	4.962%
2025	5.683%
2026	5.818%
2027	5.914%
2028	5.649%
2029	5.500%
2030	5.250%
2031 and Beyond	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, 75% 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) and 25% are assumed to become eligible for Medicare earlier than age 65 due to disability. 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 rather than due to disability.

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
June 30, 2020	\$1,222.51	\$431.50
June 30, 2021	\$1,319.00	\$463.10

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

**Includes Medicare Part B premium.



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 EMPLOYEES

Plan Specific Assumptions and Methods

MORTALITY RATES:

Pre-Retirement:

Pub-2010 Amount Weighted General Employee Rates projected generationally; females set forward 2 years

Post-Retirement:

Pub-2010 Amount Weighted General Healthy Retiree Rates projected generationally; 110% of rates for females

Post-Disablement:

Pub-2010 Amount Weighted General Disabled Rates projected generationally; males and females set forward 3 years

Beneficiaries and Survivors:

Pub-2010 Amount Weighted General Contingent Annuitant Rates projected generationally; 110% of rates for males and females

Mortality Improvement:

Rates projected generationally with a Modified MP-2020 Improvement Scale that is 75% of the MP-2020 rates

State Mortality Base Rates								
Age	Male				Female			
	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor
20	0.00037	0.00037	0.00316	0.00041	0.00011	0.00014	0.00176	0.00014
25	0.00028	0.00028	0.00321	0.00031	0.00011	0.00010	0.00215	0.00010
30	0.00036	0.00036	0.00411	0.00040	0.00018	0.00017	0.00336	0.00017
35	0.00047	0.00047	0.00555	0.00052	0.00028	0.00025	0.00524	0.00025
40	0.00066	0.00066	0.00834	0.00073	0.00043	0.00040	0.00825	0.00040
45	0.00098	0.00098	0.01342	0.00604	0.00066	0.00062	0.01267	0.00288
50	0.00149	0.00298	0.01921	0.00771	0.00097	0.00244	0.01640	0.00352
55	0.00219	0.00431	0.02355	0.00906	0.00144	0.00315	0.01874	0.00491
60	0.00319	0.00615	0.02785	0.01113	0.00222	0.00422	0.02110	0.00684
65	0.00468	0.00913	0.03524	0.01522	0.00362	0.00674	0.02569	0.00989
70	0.00703	0.01526	0.04599	0.02342	0.00598	0.01169	0.03464	0.01488
75	0.01096	0.02671	0.06347	0.03720	0.00986	0.02071	0.05075	0.02366
80	0.01730	0.04774	0.09259	0.05896	0.04276	0.03696	0.07811	0.03930
85		0.08591	0.13603	0.09617		0.06826	0.11878	0.06948
90		0.14672	0.20588	0.15860		0.12636	0.16740	0.12462

Mortality improvement is anticipated with a modified MP-2020 Improvement Scale.



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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
50	0.0000	0.0000	0.0000	0.0325	0.0325	0.1250	0.1250
51	0.0000	0.0000	0.0000	0.0325	0.0300	0.0800	0.0900
52	0.0000	0.0000	0.0000	0.0325	0.0300	0.0800	0.0900
53	0.0000	0.0000	0.0000	0.0325	0.0300	0.0800	0.0900
54	0.0000	0.0000	0.0000	0.0325	0.0300	0.0800	0.0900
55	0.0000	0.0450	0.0450	0.0450	0.0350	0.0800	0.0900
56	0.0000	0.0450	0.0400	0.0400	0.0400	0.0800	0.0900
57	0.0000	0.0450	0.0400	0.0400	0.0400	0.0800	0.0900
58	0.0000	0.0450	0.0400	0.0400	0.0400	0.1000	0.0900
59	0.0000	0.0450	0.0400	0.0400	0.0400	0.1000	0.0900
60	0.0000	0.0450	0.0500	0.0500	0.0500	0.1150	0.0900
61	0.0000	0.1500	0.0750	0.0750	0.0750	0.1700	0.1500
62	0.0000	0.1500	0.1000	0.1000	0.1000	0.1700	0.2000
63	0.0000	0.1500	0.1000	0.1000	0.1000	0.1700	0.1750
64	0.0000	0.1500	0.1350	0.1350	0.1350	0.1700	0.1750
65	0.0000	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
66	0.0000	0.2750	0.2500	0.2500	0.2500	0.2500	0.2500
67	0.0000	0.2750	0.2200	0.2200	0.2200	0.2200	0.2200
68	0.0000	0.2000	0.2200	0.2200	0.2200	0.2200	0.2200
69	0.0000	0.2000	0.2200	0.2200	0.2200	0.2200	0.2200
70	0.0000	0.2000	0.2200	0.2200	0.2200	0.2200	0.2200
71	0.0000	0.2000	0.2200	0.2200	0.2200	0.2200	0.2200
72	0.0000	0.2000	0.2200	0.2200	0.2200	0.2200	0.2200
73	0.0000	0.2000	0.2200	0.2200	0.2200	0.2200	0.2200
74	0.0000	0.2000	0.2200	0.2200	0.2200	0.2200	0.2200
75	0.0000	0.2000	0.2200	0.2200	0.2200	0.2200	0.2200
76	0.0000	0.2000	0.2200	0.2200	0.2200	0.2200	0.2200
77	0.0000	0.2000	0.2200	0.2200	0.2200	0.2200	0.2200
78	0.0000	0.2000	0.2200	0.2200	0.2200	0.2200	0.2200
79	0.0000	0.2000	0.2200	0.2200	0.2200	0.2200	0.2200
>=80	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000



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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
50	0.0000	0.0000	0.0000	0.0400	0.0400	0.0750	0.0750
51	0.0000	0.0000	0.0000	0.0400	0.0300	0.0750	0.0600
52	0.0000	0.0000	0.0000	0.0400	0.0350	0.0750	0.0600
53	0.0000	0.0000	0.0000	0.0500	0.0350	0.0750	0.0800
54	0.0000	0.0000	0.0000	0.0500	0.0350	0.0750	0.0800
55	0.0000	0.0500	0.0500	0.0500	0.0400	0.0750	0.0800
56	0.0000	0.0500	0.0400	0.0400	0.0400	0.0750	0.0800
57	0.0000	0.0500	0.0400	0.0400	0.0400	0.1000	0.0900
58	0.0000	0.0500	0.0450	0.0450	0.0450	0.1000	0.0900
59	0.0000	0.0500	0.0500	0.0500	0.0500	0.1200	0.0900
60	0.0000	0.0500	0.0550	0.0550	0.0550	0.1200	0.1250
61	0.0000	0.0750	0.0800	0.0800	0.0800	0.1200	0.1600
62	0.0000	0.1000	0.1200	0.1200	0.1200	0.2250	0.2000
63	0.0000	0.1750	0.1200	0.1200	0.1200	0.2250	0.1750
64	0.0000	0.1750	0.1500	0.1500	0.1500	0.2250	0.1750
65	0.0000	0.2750	0.2750	0.2750	0.2750	0.2750	0.3000
66	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
67	0.0000	0.3000	0.2500	0.2500	0.2500	0.2500	0.2500
68	0.0000	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
69	0.0000	0.2500	0.2700	0.2700	0.2700	0.2700	0.2700
70	0.0000	0.2500	0.2700	0.2700	0.2700	0.2700	0.2700
71	0.0000	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
72	0.0000	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
73	0.0000	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
74	0.0000	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
75	0.0000	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
76	0.0000	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
77	0.0000	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
78	0.0000	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
79	0.0000	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
≥80	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000



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	6-24	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	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	0.080	0.080
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	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	0.080	0.080
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	0.080	0.080	0.080	0.080	0.080
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	0.080	0.080	0.080	0.080	0.080	0.080
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	0.080	0.080	0.080	0.080	0.080	0.080	0.080
56	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	0.080	0.080	0.080	0.080	0.080	0.080
57	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
58	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
59	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
60	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
61	0.000	0.080	0.075	0.075	0.075	0.075	0.080	0.080	0.080	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075
62	0.000	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
63	0.000	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
64	0.000	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
65	0.000	0.200	0.200	0.200	0.200	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	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
67	0.000	0.230	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	0.200	0.200	0.200	0.200
68	0.000	0.250	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	0.200	0.200	0.200	0.200
69	0.000	0.250	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	0.200	0.200	0.200	0.200
70	0.000	0.250	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	0.200	0.200	0.200	0.200
71	0.000	0.250	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	0.200	0.200	0.200	0.200
72	0.000	0.250	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	0.200	0.200	0.200	0.200
73	0.000	0.250	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	0.200	0.200	0.200	0.200
74	0.000	0.250	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	0.200	0.200	0.200	0.200
75	0.000	0.250	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	0.200	0.200	0.200	0.200
76	0.000	0.250	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	0.200	0.200	0.200	0.200
77	0.000	0.250	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	0.200	0.200	0.200	0.200
78	0.000	0.250	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	0.200	0.200	0.200	0.200
79	0.000	0.250	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	0.200	0.200	0.200	0.200
>=80	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	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	6-24	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	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	0.080	0.080
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	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	0.080	0.080
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	0.080	0.080	0.080	0.080	0.080
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	0.080	0.080	0.080	0.080	0.080	0.080
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	0.080	0.080	0.080	0.080	0.080	0.080	0.080
56	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	0.080	0.080	0.080	0.080	0.080	0.080
57	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
58	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
59	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
60	0.000	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
61	0.000	0.080	0.075	0.075	0.075	0.075	0.080	0.080	0.080	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075
62	0.000	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
63	0.000	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
64	0.000	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
65	0.000	0.200	0.200	0.200	0.200	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	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
67	0.000	0.230	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	0.200	0.200	0.200	0.200
68	0.000	0.250	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	0.200	0.200	0.200	0.200
69	0.000	0.250	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	0.200	0.200	0.200	0.200
70	0.000	0.250	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	0.200	0.200	0.200	0.200
71	0.000	0.250	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	0.200	0.200	0.200	0.200
72	0.000	0.250	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	0.200	0.200	0.200	0.200
73	0.000	0.250	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	0.200	0.200	0.200	0.200
74	0.000	0.250	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	0.200	0.200	0.200	0.200
75	0.000	0.250	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	0.200	0.200	0.200	0.200
76	0.000	0.250	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	0.200	0.200	0.200	0.200
77	0.000	0.250	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	0.200	0.200	0.200	0.200
78	0.000	0.250	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	0.200	0.200	0.200	0.200
79	0.000	0.250	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	0.200	0.200	0.200	0.200
>=80	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	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 Termination Rates, Male											
Age	Years of Service										
	0	1	2	3	4	5	6	7	8	9	>=10
20	0.27455	0.24436	0.21876	0.19618	0.17376	0.15141	0.13019	0.11442	0.10694	0.11166	0.13006
25	0.23974	0.21579	0.19409	0.17424	0.15524	0.13693	0.11975	0.10595	0.09746	0.09732	0.10701
30	0.19848	0.17836	0.15985	0.14343	0.12952	0.11720	0.10578	0.09487	0.08505	0.07808	0.07539
35	0.17716	0.15218	0.13247	0.11805	0.10829	0.10087	0.09383	0.08541	0.07535	0.06447	0.05388
40	0.16592	0.13267	0.10974	0.09619	0.08963	0.08644	0.08292	0.07677	0.06737	0.05473	0.03929
45	0.15975	0.11918	0.09302	0.07949	0.07467	0.07461	0.07339	0.06905	0.06126	0.04945	0.03331
50	0.15528	0.11158	0.08401	0.07030	0.06578	0.06661	0.06592	0.06272	0.05733	0.04934	0.03819
55	0.15197	0.11087	0.08483	0.07159	0.06658	0.06381	0.06149	0.05872	0.05613	0.05509	0.05439
60	0.15091	0.11838	0.09735	0.08612	0.08094	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
65	0.15304	0.13450	0.12193	0.11472	0.11037	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
70	0.16014	0.16414	0.16565	0.16590	0.16406	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

State Termination Rates, Female											
Age	Years of Service										
	0	1	2	3	4	5	6	7	8	9	>=10
20	0.31051	0.30337	0.28078	0.24487	0.20381	0.16715	0.14191	0.11957	0.10836	0.11872	0.15981
25	0.27376	0.26249	0.24118	0.21199	0.18029	0.15160	0.13004	0.11112	0.09997	0.10375	0.12876
30	0.23050	0.21033	0.18887	0.16746	0.14755	0.12956	0.11392	0.10015	0.08933	0.08403	0.08671
35	0.20766	0.17777	0.15365	0.13514	0.12123	0.10996	0.09994	0.09070	0.08104	0.07066	0.05980
40	0.19406	0.15556	0.12786	0.10975	0.09881	0.09213	0.08715	0.08194	0.07420	0.06178	0.04364
45	0.18340	0.13974	0.10951	0.09110	0.08142	0.07776	0.07634	0.07404	0.06888	0.05803	0.04010
50	0.17198	0.12790	0.09781	0.08001	0.07116	0.06882	0.06860	0.06763	0.06550	0.06030	0.05125
55	0.16001	0.12044	0.09383	0.07856	0.07120	0.06731	0.06491	0.06383	0.06463	0.06942	0.07765
60	0.14937	0.11902	0.09937	0.08896	0.08486	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
65	0.14142	0.12453	0.11513	0.11187	0.11326	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
70	0.13651	0.14019	0.14662	0.15441	0.16495	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:

Pub-2010 Amount Weighted Safety Employee Rates projected generationally; 95% of rates for males; 105% of rates for females set forward 2 years

Post-Retirement:

Pub-2010 Amount Weighted Safety Healthy Retiree Rates projected generationally; 110% of rates for males; 105% of rates for females set forward 3 years

Post-Disablement:

Pub-2010 Amount Weighted General Disabled Rates projected generationally; 95% of rates for males set back 3 years; 90% of rates for females set back 3 years

Beneficiaries and Survivors:

Pub-2010 Amount Weighted Safety Contingent Annuitant Rates projected generationally; 110% of rates for males and females set forward 2 years

Mortality Improvement:

Rates projected generationally with a Modified MP-2020 Improvement Scale that is 75% of the MP-2020 rates

SPORS Mortality Base Rates								
Age	Male				Female			
	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor
20	0.00039	0.00045	0.00030	0.00044	0.00018	0.00019	0.00011	0.00019
25	0.00035	0.00041	0.00334	0.00043	0.00023	0.00025	0.00175	0.00024
30	0.00039	0.00045	0.00291	0.00047	0.00032	0.00034	0.00176	0.00033
35	0.00045	0.00052	0.00372	0.00055	0.00043	0.00045	0.00276	0.00045
40	0.00056	0.00065	0.00492	0.00074	0.00059	0.00062	0.00431	0.00062
45	0.00078	0.00134	0.00725	0.00656	0.00080	0.00126	0.00679	0.00312
50	0.00114	0.00211	0.01160	0.00822	0.00108	0.00217	0.01050	0.00403
55	0.00166	0.00337	0.01727	0.00976	0.00147	0.00376	0.01428	0.00559
60	0.00251	0.00559	0.02166	0.01243	0.00200	0.00649	0.01650	0.00789
65	0.00390	0.00969	0.02543	0.01791	0.00315	0.01121	0.01846	0.01158
70	0.00728	0.01725	0.03185	0.02818	0.00628	0.01936	0.02205	0.01781
75	0.01360	0.03109	0.04127	0.04466	0.01249	0.03344	0.02915	0.02881
80	0.02541	0.05613	0.05625	0.07148	0.05177	0.05774	0.04210	0.04901
85		0.10049	0.08137	0.11732		0.09971	0.06435	0.08833
90		0.17446	0.11975	0.19311		0.16715	0.09913	0.15347

Mortality improvement is anticipated with a modified MP-2020 Improvement Scale.



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	≥26
≤49	0.000	0.000	0.000	0.000
50	0.000	0.100	0.100	0.100
51	0.000	0.030	0.100	0.100
52	0.000	0.030	0.100	0.100
53	0.000	0.030	0.100	0.100
54	0.000	0.030	0.100	0.100
55	0.000	0.060	0.100	0.200
56	0.000	0.060	0.100	0.130
57	0.000	0.060	0.100	0.130
58	0.000	0.100	0.100	0.130
59	0.000	0.100	0.100	0.130
60	0.000	0.100	0.100	0.130
61	0.000	0.100	0.100	0.130
62	0.000	0.200	0.200	0.200
63	0.000	0.200	0.200	0.300
64	0.000	0.200	0.200	0.300
65	0.000	0.200	0.200	0.500
66	0.000	0.200	0.200	0.500
67	0.000	0.200	0.200	0.500
68	0.000	0.200	0.200	0.500
69	0.000	0.200	0.200	0.500
≥70	0.000	1.000	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 years of service (for causes other than death, disability, or retirement).

SPORS Termination Rates	
Service	Unisex
0	0.08000
1	0.06000
2	0.06000
3	0.06000
4	0.06000
5	0.06000
6	0.06000
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:

Pub-2010 Amount Weighted Safety Employee Rates projected generationally; 95% of rates for males; 105% of rates for females set forward 2 years

Post-Retirement:

Pub-2010 Amount Weighted Safety Healthy Retiree Rates projected generationally; 110% of rates for males; 105% of rates for females set forward 3 years

Post-Disablement:

Pub-2010 Amount Weighted General Disabled Rates projected generationally; 95% of rates for males set back 3 years; 90% of rates for females set back 3 years

Beneficiaries and Survivors:

Pub-2010 Amount Weighted Safety Contingent Annuitant Rates projected generationally; 110% of rates for males and females set forward 2 years

Mortality Improvement:

Rates projected generationally with a Modified MP-2020 Improvement Scale that is 75% of the MP-2020 rates

VaLORS Mortality Base Rates								
Age	Male				Female			
	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor
20	0.00039	0.00045	0.00030	0.00044	0.00018	0.00019	0.00011	0.00019
25	0.00035	0.00041	0.00334	0.00043	0.00023	0.00025	0.00175	0.00024
30	0.00039	0.00045	0.00291	0.00047	0.00032	0.00034	0.00176	0.00033
35	0.00045	0.00052	0.00372	0.00055	0.00043	0.00045	0.00276	0.00045
40	0.00056	0.00065	0.00492	0.00074	0.00059	0.00062	0.00431	0.00062
45	0.00078	0.00134	0.00725	0.00656	0.00080	0.00126	0.00679	0.00312
50	0.00114	0.00211	0.01160	0.00822	0.00108	0.00217	0.01050	0.00403
55	0.00166	0.00337	0.01727	0.00976	0.00147	0.00376	0.01428	0.00559
60	0.00251	0.00559	0.02166	0.01243	0.00200	0.00649	0.01650	0.00789
65	0.00390	0.00969	0.02543	0.01791	0.00315	0.01121	0.01846	0.01158
70	0.00728	0.01725	0.03185	0.02818	0.00628	0.01936	0.02205	0.01781
75	0.01360	0.03109	0.04127	0.04466	0.01249	0.03344	0.02915	0.02881
80	0.02541	0.05613	0.05625	0.07148	0.05177	0.05774	0.04210	0.04901
85		0.10049	0.08137	0.11732		0.09971	0.06435	0.08833
90		0.17446	0.11975	0.19311		0.16715	0.09913	0.15347

Mortality improvement is anticipated with a modified MP-2020 Improvement Scale.



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	0.150	0.150	0.450	0.450
51	0.000	0.100	0.080	0.300	0.300
52	0.000	0.100	0.080	0.300	0.300
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	0.250
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	0.300
61	0.000	0.180	0.200	0.200	0.200
62	0.000	0.180	0.300	0.300	0.300
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	0.150	0.300	0.300	0.300
66	0.000	0.150	0.300	0.300	0.300
67	0.000	0.150	0.300	0.300	0.300
68	0.000	0.150	0.300	0.300	0.300
69	0.000	0.150	0.300	0.300	0.300
≥70	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	0.150	0.150	0.375	0.375
51	0.000	0.100	0.100	0.250	0.200
52	0.000	0.100	0.090	0.250	0.200
53	0.000	0.100	0.090	0.250	0.225
54	0.000	0.100	0.090	0.250	0.300
55	0.000	0.100	0.090	0.250	0.300
56	0.000	0.100	0.100	0.250	0.300
57	0.000	0.100	0.130	0.250	0.180
58	0.000	0.100	0.130	0.400	0.180
59	0.000	0.100	0.130	0.300	0.200
60	0.000	0.200	0.200	0.200	0.200
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	0.250	0.250	0.250
64	0.000	0.200	0.250	0.250	0.250
65	0.000	0.200	0.500	0.500	0.500
66	0.000	0.200	0.300	0.300	0.300
67	0.000	0.200	0.300	0.300	0.300
68	0.000	0.200	0.300	0.300	0.300
69	0.000	0.200	0.300	0.300	0.300
≥70	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	0.39130	0.29901	0.23922	0.21072	0.20801	0.21063	0.20749	0.19800	0.19643	0.19065	0.21396
25	0.36285	0.28479	0.23294	0.20555	0.19714	0.19438	0.18892	0.17882	0.17232	0.16314	0.17288
30	0.32624	0.26656	0.22474	0.19872	0.18316	0.17349	0.16486	0.15375	0.14058	0.12618	0.11671
35	0.29590	0.24719	0.21139	0.18685	0.16890	0.15650	0.14654	0.13513	0.11884	0.10094	0.07962
40	0.26990	0.22715	0.19453	0.17109	0.15383	0.14157	0.13160	0.12059	0.10400	0.08381	0.05579
45	0.24947	0.20776	0.17527	0.15163	0.13800	0.12852	0.11960	0.10962	0.09617	0.07511	0.04653
50	0.23564	0.19022	0.15449	0.12845	0.12136	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
55	0.22917	0.17523	0.13271	0.10157	0.10390	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
60	0.23045	0.16307	0.11015	0.07107	0.08562	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
65	0.23923	0.15385	0.08724	0.03755	0.06679	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
70	0.25880	0.14725	0.06100	0.00455	0.04490	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	0.47177	0.35733	0.28556	0.25386	0.26029	0.28130	0.30657	0.32166	0.31215	0.30524	0.22840
25	0.43786	0.33985	0.27627	0.24458	0.24051	0.24937	0.26238	0.26963	0.25996	0.24867	0.18991
30	0.39363	0.31781	0.26502	0.23302	0.21502	0.20767	0.20420	0.20042	0.18976	0.17234	0.13686
35	0.35591	0.29532	0.25008	0.21852	0.19421	0.17876	0.16674	0.15620	0.14391	0.12349	0.09981
40	0.32307	0.27240	0.23204	0.20097	0.17622	0.15870	0.14410	0.12972	0.11499	0.09385	0.07347
45	0.29713	0.25007	0.21104	0.17970	0.16112	0.14777	0.13695	0.12161	0.10324	0.08381	0.04500
50	0.27965	0.22915	0.18712	0.15384	0.14876	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
55	0.27168	0.21009	0.16023	0.12279	0.13911	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
60	0.27367	0.19304	0.13033	0.08631	0.13217	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
65	0.28529	0.17815	0.09796	0.04508	0.12790	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
70	0.31084	0.16417	0.05830	0.00350	0.12656	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, HAZARDOUS DUTY

Plan Specific Assumptions and Methods

MORTALITY RATES:

Pre-Retirement:

Pub-2010 Amount Weighted Safety Employee Rates projected generationally; 95% of rates for males; 105% of rates for females set forward 2 years

Post-Retirement:

Pub-2010 Amount Weighted Safety Healthy Retiree Rates projected generationally; 110% of rates for males; 105% of rates for females set forward 3 years

Post-Disablement:

Pub-2010 Amount Weighted General Disabled Rates projected generationally; 95% of rates for males set back 3 years; 90% of rates for females set back 3 years

Beneficiaries and Survivors:

Pub-2010 Amount Weighted Safety Contingent Annuitant Rates projected generationally; 110% of rates for males and females set forward 2 years

Mortality Improvement:

Rates projected generationally with a Modified MP-2020 Improvement Scale that is 75% of the MP-2020 rates

Top 10 Hazardous Duty Mortality Base Rates								
Age	Male				Female			
	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor
20	0.00039	0.00045	0.00030	0.00044	0.00018	0.00019	0.00011	0.00019
25	0.00035	0.00041	0.00334	0.00043	0.00023	0.00025	0.00175	0.00024
30	0.00039	0.00045	0.00291	0.00047	0.00032	0.00034	0.00176	0.00033
35	0.00045	0.00052	0.00372	0.00055	0.00043	0.00045	0.00276	0.00045
40	0.00056	0.00065	0.00492	0.00074	0.00059	0.00062	0.00431	0.00062
45	0.00078	0.00134	0.00725	0.00656	0.00080	0.00126	0.00679	0.00312
50	0.00114	0.00211	0.01160	0.00822	0.00108	0.00217	0.01050	0.00403
55	0.00166	0.00337	0.01727	0.00976	0.00147	0.00376	0.01428	0.00559
60	0.00251	0.00559	0.02166	0.01243	0.00200	0.00649	0.01650	0.00789
65	0.00390	0.00969	0.02543	0.01791	0.00315	0.01121	0.01846	0.01158
70	0.00728	0.01725	0.03185	0.02818	0.00628	0.01936	0.02205	0.01781
75	0.01360	0.03109	0.04127	0.04466	0.01249	0.03344	0.02915	0.02881
80	0.02541	0.05613	0.05625	0.07148	0.05177	0.05774	0.04210	0.04901
85		0.10049	0.08137	0.11732		0.09971	0.06435	0.08833
90		0.17446	0.11975	0.19311		0.16715	0.09913	0.15347

Mortality improvement is anticipated with a modified MP-2020 Improvement Scale.



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 Hazardous Duty Retirement Rates, Male					
Age	Years of Service				
	0-4	5	6-24	25	≥26
≤49	0.0000	0.0000	0.0000	0.0000	0.0000
50	0.0000	0.0650	0.0650	0.2000	0.2000
51	0.0000	0.0650	0.0600	0.2500	0.2000
52	0.0000	0.0650	0.0600	0.2500	0.2000
53	0.0000	0.0650	0.0600	0.2500	0.2400
54	0.0000	0.0650	0.0600	0.2500	0.2400
55	0.0000	0.0650	0.0600	0.2500	0.2400
56	0.0000	0.0650	0.0600	0.2100	0.2000
57	0.0000	0.0650	0.0600	0.2100	0.2000
58	0.0000	0.0650	0.0600	0.2100	0.2000
59	0.0000	0.0650	0.1000	0.2100	0.2000
60	0.0000	0.2100	0.2100	0.2100	0.2300
61	0.0000	0.3750	0.2300	0.2300	0.2300
62	0.0000	0.3750	0.2700	0.2700	0.2700
63	0.0000	0.3750	0.2700	0.2700	0.2700
64	0.0000	0.3750	0.2700	0.2700	0.2700
65	0.0000	0.3750	0.3500	0.3500	0.3500
66	0.0000	0.3750	0.3500	0.3500	0.3500
67	0.0000	0.3750	0.3500	0.3500	0.3500
68	0.0000	0.3750	0.3500	0.3500	0.3500
69	0.0000	0.3750	0.3500	0.3500	0.3500
≥70	0.0000	1.0000	1.0000	1.0000	1.0000



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

Top 10 Hazardous Duty Retirement Rates, Female					
Age	Years of Service				
	0-4	5	6-24	25	≥26
≤49	0.0000	0.0000	0.0000	0.0000	0.0000
50	0.0000	0.0600	0.0600	0.2500	0.2500
51	0.0000	0.0600	0.0875	0.2500	0.3000
52	0.0000	0.0600	0.0750	0.2500	0.3000
53	0.0000	0.0600	0.0750	0.2500	0.3000
54	0.0000	0.0600	0.0750	0.2500	0.3000
55	0.0000	0.0600	0.0750	0.2500	0.4000
56	0.0000	0.0600	0.1400	0.2500	0.4000
57	0.0000	0.0600	0.1400	0.2500	0.2500
58	0.0000	0.0600	0.1400	0.2500	0.2500
59	0.0000	0.0600	0.1400	0.2500	0.2500
60	0.0000	0.1500	0.1500	0.1500	0.2500
61	0.0000	0.1500	0.1500	0.1500	0.1500
62	0.0000	0.1500	0.1500	0.1500	0.1500
63	0.0000	0.1500	0.1500	0.1500	0.1500
64	0.0000	0.1500	0.3000	0.3000	0.3000
65	0.0000	0.1500	0.3000	0.3000	0.3000
66	0.0000	0.1500	0.3000	0.3000	0.3000
67	0.0000	0.1500	0.3000	0.3000	0.3000
68	0.0000	0.1500	0.3000	0.3000	0.3000
69	0.0000	0.1500	0.3000	0.3000	0.3000
≥70	0.0000	1.0000	1.0000	1.0000	1.0000



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

DISABILITY RATES: As shown below for selected ages.

Top 10 Hazardous Duty 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 years of service (for causes other than death, disability, or retirement).

Top 10 Hazardous Duty Termination Rates		
Service	Male	Female
0	0.05500	0.07000
1	0.04000	0.07000
2	0.04000	0.07000
3	0.04000	0.05000
4	0.04000	0.05000
5	0.03000	0.05000
6	0.02500	0.03000
7	0.02500	0.03000
8	0.02500	0.03500
9	0.01500	0.01500
10	0.01000	0.01500
11	0.01000	0.01500
12	0.01000	0.01500
13	0.01000	0.01500
>=14	0.00800	0.01500



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, HAZARDOUS DUTY

Plan Specific Assumptions and Methods

MORTALITY RATES:

Pre-Retirement:

Pub-2010 Amount Weighted Safety Employee Rates projected generationally; 95% of rates for males; 105% of rates for females set forward 2 years

Post-Retirement:

Pub-2010 Amount Weighted Safety Healthy Retiree Rates projected generationally; 110% of rates for males; 105% of rates for females set forward 3 years

Post-Disablement:

Pub-2010 Amount Weighted General Disabled Rates projected generationally; 95% of rates for males set back 3 years; 90% of rates for females set back 3 years

Beneficiaries and Survivors:

Pub-2010 Amount Weighted Safety Contingent Annuitant Rates projected generationally; 110% of rates for males and females set forward 2 years

Mortality Improvement:

Rates projected generationally with a Modified MP-2020 Improvement Scale that is 75% of the MP-2020 rates

Non-Top 10 Hazardous Duty Mortality Base Rates								
Age	Male				Female			
	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor	Pre Retirement	Post Retirement	Post Disablement	Beneficiary & Survivor
20	0.00039	0.00045	0.00030	0.00044	0.00018	0.00019	0.00011	0.00019
25	0.00035	0.00041	0.00334	0.00043	0.00023	0.00025	0.00175	0.00024
30	0.00039	0.00045	0.00291	0.00047	0.00032	0.00034	0.00176	0.00033
35	0.00045	0.00052	0.00372	0.00055	0.00043	0.00045	0.00276	0.00045
40	0.00056	0.00065	0.00492	0.00074	0.00059	0.00062	0.00431	0.00062
45	0.00078	0.00134	0.00725	0.00656	0.00080	0.00126	0.00679	0.00312
50	0.00114	0.00211	0.01160	0.00822	0.00108	0.00217	0.01050	0.00403
55	0.00166	0.00337	0.01727	0.00976	0.00147	0.00376	0.01428	0.00559
60	0.00251	0.00559	0.02166	0.01243	0.00200	0.00649	0.01650	0.00789
65	0.00390	0.00969	0.02543	0.01791	0.00315	0.01121	0.01846	0.01158
70	0.00728	0.01725	0.03185	0.02818	0.00628	0.01936	0.02205	0.01781
75	0.01360	0.03109	0.04127	0.04466	0.01249	0.03344	0.02915	0.02881
80	0.02541	0.05613	0.05625	0.07148	0.05177	0.05774	0.04210	0.04901
85		0.10049	0.08137	0.11732		0.09971	0.06435	0.08833
90		0.17446	0.11975	0.19311		0.16715	0.09913	0.15347

Mortality improvement is anticipated with a modified MP-2020 Improvement Scale.



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 Hazardous Duty 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	0.070	0.075	0.200	0.200
52	0.000	0.070	0.075	0.200	0.200
53	0.000	0.070	0.075	0.200	0.200
54	0.000	0.070	0.075	0.200	0.200
55	0.000	0.070	0.075	0.200	0.200
56	0.000	0.070	0.075	0.200	0.200
57	0.000	0.070	0.075	0.200	0.200
58	0.000	0.070	0.080	0.200	0.165
59	0.000	0.070	0.120	0.200	0.240
60	0.000	0.150	0.150	0.150	0.240
61	0.000	0.200	0.240	0.240	0.240
62	0.000	0.200	0.275	0.275	0.275
63	0.000	0.200	0.275	0.275	0.275
64	0.000	0.200	0.275	0.275	0.275
65	0.000	0.500	0.275	0.275	0.275
66	0.000	0.500	0.500	0.500	0.500
67	0.000	0.500	0.500	0.500	0.500
68	0.000	0.500	0.500	0.500	0.500
69	0.000	0.500	0.500	0.500	0.500
≥70	0.000	1.000	1.000	1.000	1.000



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

Non-Top 10 Hazardous Duty 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	0.060	0.060	0.300	0.300
51	0.000	0.100	0.090	0.200	0.200
52	0.000	0.100	0.090	0.200	0.200
53	0.000	0.100	0.090	0.200	0.200
54	0.000	0.100	0.090	0.200	0.300
55	0.000	0.100	0.090	0.200	0.300
56	0.000	0.100	0.120	0.200	0.300
57	0.000	0.100	0.120	0.200	0.250
58	0.000	0.100	0.120	0.200	0.250
59	0.000	0.100	0.120	0.200	0.250
60	0.000	0.150	0.150	0.150	0.250
61	0.000	0.150	0.250	0.250	0.250
62	0.000	0.150	0.250	0.250	0.250
63	0.000	0.150	0.250	0.250	0.250
64	0.000	0.150	0.250	0.250	0.250
65	0.000	0.150	0.400	0.400	0.400
66	0.000	0.150	0.400	0.400	0.400
67	0.000	0.150	0.400	0.400	0.400
68	0.000	0.150	0.400	0.400	0.400
69	0.000	0.150	0.400	0.400	0.400
≥70	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 Hazardous Duty 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 years of service (for causes other than death, disability, or retirement).

Non-Top 10 Hazardous Duty Termination Rates		
Service	Males	Females
0	0.11000	0.20000
1	0.11000	0.15000
2	0.09500	0.10000
3	0.08500	0.08500
4	0.07500	0.07000
5	0.06500	0.07000
6	0.06500	0.07000
7	0.04000	0.07000
8	0.04000	0.07000
9	0.04000	0.06000
10	0.02500	0.03500
11	0.02500	0.03500
12	0.02500	0.03500
13	0.02500	0.03500
14	0.02500	0.03500
15	0.02000	0.03500
≥16	0.02000	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 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 6.75%). 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.



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. LODA health care premiums for fiscal years 2021 and 2022 are shown on the following page.

Per capita costs were based upon the adjusted experience of those members currently receiving health care benefits from the Plan using high-level assumptions and estimates. This includes the demographic adjustments made for the Plan's covered population, the mix of health care plan and coverage elections made by LODA members, the level of benefits to be provided and the health care trend assumption. 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)

Premiums for Fiscal Years 2021 and 2022

FY 2022				
Membership Level	LODA Plan Current LODA Employment	LODA Plan Former LODA Employment	Medicare Primary	Medicare Part B Premium
Single	\$1,016	\$1,049	\$293	\$170.10
Two Person	\$1,733	\$1,764	N/A	N/A
Family (3 or more family members)	\$2,458	\$2,486	N/A	N/A

FY 2021				
Membership Level	LODA Plan Current LODA Employment	LODA Plan Former LODA Employment	Medicare Primary	Medicare Part B Premium
Single	\$948	\$979	\$283	\$148.50
Two Person	\$1,618	\$1,647	N/A	N/A
Family (3 or more family members)	\$2,295	\$2,321	N/A	N/A

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. Review of the information currently available did not identify any specific provisions of the ACA that are anticipated to significantly impact results other than plan design features and fees currently mandated by the ACA and incorporated in the plan designs, which are included in the current baseline claims costs. Continued monitoring of the ACA’s impact on the Plan’s liability will be required.

COVID-19

The impact of the COVID-19 pandemic was considered in this valuation; however, no explicit changes were incorporated at this time other than the inclusion of COVID-19 as a presumption for certain members due to House Bills 1985 and 2207 (HB 1985, HB 2207). Given the uncertainty regarding COVID-19 (e.g., the impact of routine care being deferred, direct COVID-19 treatment and prevention costs, changes in contribution and budget projections), continued monitoring of the impact on the Plan’s liability will be required.



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

Presumptions

"Deceased person" or "Disabled person" means any individual whose death or incapacity occurs in the line of duty as the direct or proximate result of the performance of his duty, including the presumptions under §§ 27-40.1, 27-40.2, 51.1-813, 65.2-402, and 65.2-402.1, as summarized below. Complete descriptions of the presumptions can be found at <https://law.lis.virginia.gov/vacodepopularnames/line-of-duty-act>:

27-40.1. and 27-40.2.

Presumption as to death or disability from respiratory diseases, hypertension, or heart disease for of salaried or volunteer fire fighters, or death of all fire fighters employed by the City of Portsmouth when death occurs subsequent to July 1, 1972, shall be presumed to be occupational diseases, suffered in the line of government duty, that are covered by this title unless such presumption is overcome by a preponderance of competent evidence to the contrary.

§ 51.1-813. Disability resulting from activities in discharge of official duties.

Any member of a county, city, or town police department or any sheriff or deputy sheriff who dies or is totally or partially disabled as a result of hypertension or heart disease shall be presumed to have died or become disabled in the line of duty, unless the contrary is shown by a preponderance of competent evidence.

§ 65.2-402. Presumption as to death or disability from respiratory disease, hypertension or heart disease, cancer.

A. Respiratory diseases for certain firefighters or Department of Emergency Management hazardous materials officers.

B. Hypertension or heart disease causing the death of, or any health condition or impairment resulting in total or partial disability for certain job titles who have completed five years of service in their position.

C. Leukemia or pancreatic, prostate, rectal, throat, ovarian, breast, colon, brain, or testicular cancer causing the death of, or any health condition or impairment resulting in total or partial disability of, any volunteer or salaried firefighter, Department of Emergency Management hazardous materials officer, commercial vehicle enforcement officer or motor carrier safety trooper employed by the Department of State Police, or full-time sworn member of the enforcement division of the Department of Motor Vehicles having completed five years of service. For colon, brain, or testicular cancer, the presumption shall not apply for any individual who was diagnosed with such a condition before July 1, 2020.

§ 65.2-402.1. Presumption as to death or disability from infectious disease.

A. Hepatitis, meningococcal meningitis, tuberculosis, or HIV causing the death of, or any health condition or impairment resulting in total or partial disability of certain job titles shall be presumed to be occupational diseases, suffered in the line of government duty, that are covered by this title unless such presumption is overcome by a preponderance of competent evidence to the contrary.

B. 1. COVID-19 causing the death of, or any health condition or impairment resulting in total or partial disability of, any health care provider, who as part of the provider's employment is directly involved in diagnosing or treating persons known or suspected to have COVID-19, shall be presumed to be an occupational disease that is covered by this title unless such presumptions are overcome by a preponderance of competent evidence to the contrary. For the purposes of this section, the COVID-19 virus shall be established by a positive diagnostic test for COVID-19 and signs and symptoms of COVID-19 that require medical treatment.



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

2. COVID-19 causing the death of, or any health condition or impairment resulting in total or partial disability of, any (i) firefighter, (ii) law-enforcement officer; (iii) correctional officer; or (iv) regional jail officer shall be presumed to be an occupational disease, suffered in the line of duty, as applicable, that is covered by this title unless such presumption is overcome by a preponderance of competent evidence to the contrary. For the purposes of this section, the COVID-19 virus shall be established by a positive diagnostic test for COVID-19, an incubation period consistent with COVID-19, and signs and symptoms of COVID-19 that require medical treatment.

In addition, § 65.2-107 covers post-traumatic stress disorder incurred by law-enforcement officers and firefighters for an incident or exposure occurring in the line of duty on or after July 1, 2020.



Schedule E – Schedule of Active Member Data

**SCHEDULE OF FULL TIME ACTIVE MEMBER DATA
AS OF JUNE 30, 2021**

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	584	562	0	5	0	0	0	0	0	1,151
25 - 29	508	1,739	0	298	0	0	0	0	0	2,545
30 - 34	364	1,094	0	1,144	209	0	0	0	0	2,811
35 - 39	232	549	0	708	955	1	0	0	0	2,445
40 - 44	159	385	0	293	1,288	165	1	0	0	2,291
45 - 49	126	298	0	220	914	566	125	2	0	2,251
50 - 54	156	274	0	184	777	356	239	44	1	2,031
55 - 59	98	144	0	118	509	147	123	118	36	1,293
60 - 64	46	81	0	57	211	137	50	45	69	696
65 - 69	12	13	0	14	42	34	19	9	31	174
70 & Up	5	2	0	0	10	10	7	3	2	39
Total	2,290	5,141	0	3,041	4,915	1,416	564	221	139	17,727