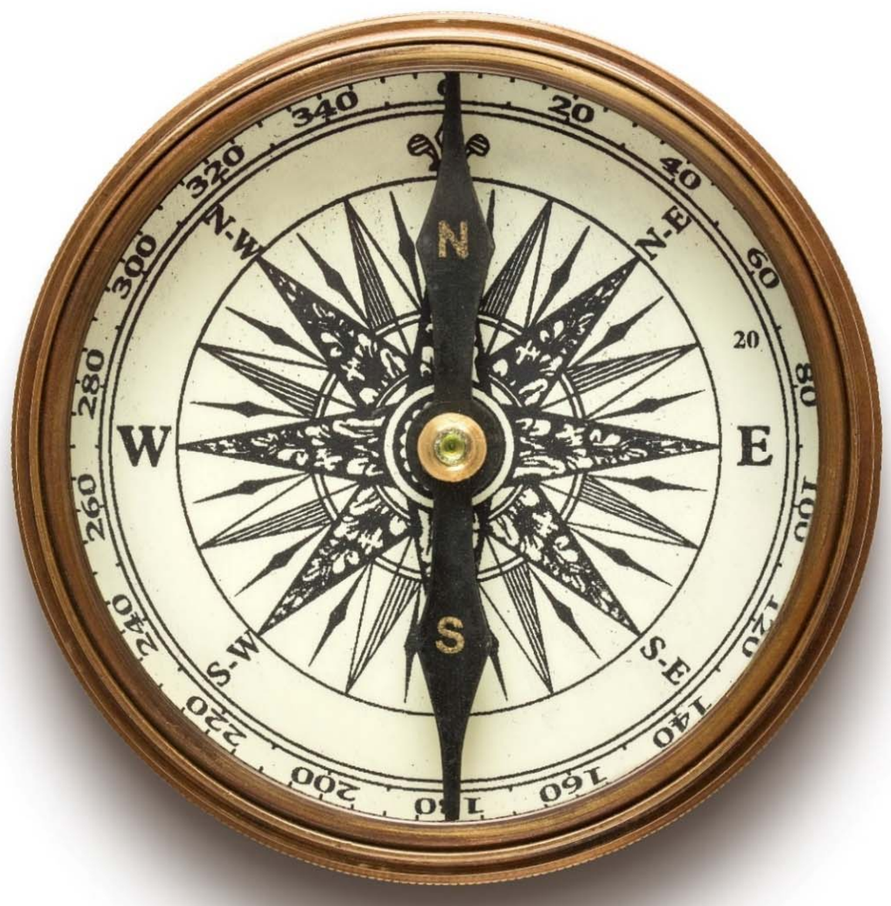

Commonwealth of Pennsylvania
Retired Pennsylvania State Police Program
January 1, 2017 Actuarial Valuation Report

Prepared by Deloitte Consulting LLP **August 2017**

Contents

Actuarial Valuation Opinion

This report presents results of the actuarial valuation of the Commonwealth of Pennsylvania's Retired Pennsylvania State Police Program ("the Plan" or "RPSPP") as of January 1, 2017. In our opinion, this report is complete and accurate and represents fairly the actuarial position of the Plan for the purposes stated herein.

The Commonwealth of Pennsylvania provided the participant data, financial information and plan descriptions used in this valuation. The actuary has analyzed the data and other information provided for reasonableness, but has not independently audited the data or other information provided. The actuary has no reason to believe the data or other information provided is not complete and accurate and knows of no further information that is essential to the preparation of the actuarial valuation.

Actuarial information under Government Accounting Standards Board Statement No. 45 (GASB 45) is for purposes of fulfilling employer financial accounting requirements. The results have been made on a basis consistent with our understanding of GASB 45 and are based upon assumptions prescribed by the Commonwealth of Pennsylvania. Determinations for purposes other than meeting employer financial accounting requirements may be significantly different from the results reported herein.

In our opinion, all costs, liabilities, rates of interest, and other factors underlying these actuarial computations have been determined on the basis of actuarial assumptions and methods that are each reasonable (or consistent with authoritative guidance) for the purposes herein taking into account the experience of the Plan and future expectations.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operations 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 program provisions or applicable law.

Our scope did not include analyzing the potential range of such future measurements, and we did not perform that analysis.

The undersigned with actuarial credentials collectively meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

This report was prepared solely for the benefit and internal use of the plan sponsor. This report is not intended for the benefit of any other party and may not be relied upon by any third party for any purpose, and Deloitte Consulting accepts no responsibility or liability with respect to any party other than the plan sponsor.

To the best of our knowledge, no employee of the Deloitte U.S. Firms is an officer or director of the employer. In addition, we are not aware of any relationship between the Deloitte U.S. Firms and the employer that may impair or appear to impair the objectivity of the work detailed in this report.

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Specialist Leader	Specialist Leader

Executive Summary

Governmental Accounting Requirement and Report Purposes

The Governmental Accounting Standards Board released the Statement of Governmental Accounting Standards No. 43 ("GASB 43") and No. 45 ("GASB 45") in 2004. The Governmental Accounting Standards Board also released the Statement of Governmental Accounting Standards No. 74 and No. 75, which amends GASB 43 and GASB 45, in June 2015. These statements require trusts (GASB 43/74) and employers (GASB 45/75) to accrue the cost of postemployment benefits other than pensions while eligible employees are providing services to the employer. The Commonwealth of Pennsylvania ("the Commonwealth") adopted GASB 45 for the fiscal year beginning July 1, 2007. The Commonwealth will adopt GASB No. 74 for the fiscal year beginning July 1, 2016 and GASB No. 75 for the fiscal year beginning July 1, 2017.

The purposes of this actuarial valuation report are to: 1) measure the Plan's accrued liabilities and normal cost, 2) provide GASB 45 disclosure information for the Commonwealth's financial reporting for fiscal year ending June 30, 2017, and 3) project expected cash flows (pay-as-you-go costs). GASB No. 74 information to fulfill the Commonwealth's trust reporting requirements will be provided in a separate valuation report.

Summary of Results

The key measures for the January 1, 2017 actuarial valuation are:

- The January 1, 2017 Unfunded Actuarial Accrued Liability (UAAL) is $4.79 billion.
- The Annual Required Contribution (ARC) for fiscal year ending June 30, 2017 is $0.32 billion, consisting of:
    - A Normal Cost of $0.11 billion, approximately 26.3% of covered payroll, and
    - An amortization cost of $0.21 billion, approximately 52.2% of covered payroll.

Under governmental accounting standards, the ARC is not required to be funded but will be a component of the retiree health benefit expense recorded in the Commonwealth's financial statements.

- As of January 1, 2017, the funded ratio for the Plan was 1.8%, given the Commonwealth's current funding policy (as described below).
- Projected cash contributions for 2017 are $1 million. Since these contributions were made after the fiscal year end, we have included them in the plan's actuarial value of assets as a receivable.

Funding Policy

The Commonwealth created the OPEB (Other Postemployment Benefits) Investment Pool, a Trust Equivalent Arrangement, during the fiscal year ended June 30, 2008. The Commonwealth plans to contribute $1 million annually until assets cover the present value of future benefits, subject to evaluation annually.

RPSPP employer contribution requirements are established within collective bargaining agreements. During the fiscal year ending June 30, 2017, employing agencies contributed $1,140 for each current RPSPP eligible active employee per biweekly pay period to fund the RPSPP. RPSPP plan members are not required to make contributions.

Background and Comments

Overview of Plans

The Commonwealth sponsors the Retired Pennsylvania State Police Program (RPSPP) for eligible retirees and their dependents to receive subsidized health coverage for the retiree's lifetime.

Changes from the Previous Actuarial Valuation

For the January 1, 2017 actuarial valuation, the results were higher than what was projected based on the previous actuarial valuation. In total, there was an increase in Unfunded Actuarial Accrued Liability of $1.01 billion (27%) compared to expectation. The increase in liability was due to the following:

- Actuarial loss of $0.63 billion (17%) due to the demographic changes, plan experience different than expected, and higher than expected claims costs primarily driven by unfavorable claims experience;
- Actuarial loss of $0.38 billion (10%) due to assumption changes, including discount rate, trend rates, and demographic assumption changes adopted by SERS based on the experience study presented to the State Employees' Retirement Board in March 2016 (additional details can be found in Appendix C and Appendix D).

Health Care Reform

The Patient Protection and Affordable Care Act ("PPACA") was signed into law on March 23, 2010. The primary objective of the act is to increase the number of Americans with health insurance coverage. There are several provisions within PPACA with potentially significant short- and long-term cost implications for employers. The applicable provisions of PPACA were first accounted for in the July 1, 2010 valuation. On December 18, 2015, the Consolidated Appropriations Act, 2016 became law. This legislation delayed the effective date of the high cost plan excise tax from 2018 to 2020 and made it tax deductible. In future years, there may continue to be increased cost impact to the extent the health & welfare program experiences increased utilization due to these changes, all of which are assumed to be in place indefinitely.

The provisions of PPACA considered are as follows:

- Prohibiting lifetime and annual limits on the dollar value of coverage for "essential health benefits"
- Increasing the dependent child age limit to age 26
- Elimination of cost sharing for in-network preventive services
- Reflecting manufacturer discounts available to certain Medicare beneficiaries receiving applicable covered Part D drugs (mostly brand) while in the coverage gap
- Transitional Reinsurance Fee
- Out-of-pocket limit includes both medical and Rx expenses
- Excise tax on "Cadillac Plans" effective in 2020

The impact of applicable provisions except for excise tax, which was valued separately, were incorporated in the per capita claims costs summarized in Appendix D.

Actuarial Methods and Assumptions

The Commonwealth of Pennsylvania State Employees' Retirement System (SERS) performs experience studies periodically to determine reasonable and appropriate economic and demographic assumptions for purposes of valuing the defined benefit pension plan. The most recent SERS experience study covered the years 2011 through 2015 and was presented to the State Employees' Retirement Board in March 2016. The approved recommendations from that study were used to determine the assumptions for this valuation, where applicable. The inflation assumption was selected by the SERS Board during an April of 2017 meeting based on a review of actual plan experience and the prevalent economic outlook. Consistent with prior valuations, these demographic assumptions assume beginning of year decrements (retirement, withdrawal, death, disability, etc.). In addition, Deloitte periodically reviews actuarial assumptions only applicable to the postemployment medical plan outside of the experience study, such as medical trend rates and age-graded medical rates.

The treatment of Medicare Part D in this report is consistent with our understanding of the GASB technical bulletin 2006-1 issued in June 2006, which states that Medicare Part D subsidy payments should not be reflected under GASB 45.

The actuarial methods and assumptions are described in the appendices of this report.

Final GASB 45 Disclosures

Most values reported here are final amounts for disclosures in the Commonwealth's financial statements; however, amounts related to the Commonwealth benefit payments for Fiscal Year 2016/2017 are currently based on estimated benefit payments and contributions. The Commonwealth's final disclosures may be updated to reflect the actual benefit payments during the fiscal year.

Summary of Actuarial Valuation Results

This section provides a summary of the actuarial valuation results. All information is provided as of the measurement date except for GASB 45 disclosure information. GASB 45 disclosure information is shown as of the end of the Fiscal Year to reflect when it will actually be disclosed. All liabilities are net of expected retiree contributions.

*(all dollar amounts are in thousands)**	January 1, 2017	January 1, 2015
a. Actuarial Accrued Liability		
(1) Active Participants	$ 1,569,605	$ 1,287,554
(2) Retired Participants**	3,305,767	2,243,461
(3) Total	$ 4,875,372	$ 3,531,015
b. Actuarial Value of Assets***	$ 88,297	$ 80,217
c. Unfunded Actuarial Accrued Liability (UAAL): (a) - (b)	$ 4,787,075	$ 3,450,798
d. Funded Ratio: (b) / (a)	1.8%	2.3%
e. UAAL as a Percentage of Covered Payroll: (c) / (g)	1164.7%	875.1%
f. Participant Counts		
(1) Active Participants	4,299	4,253
(2) Retired Participants**	4,907	4,511
(3) Total	9,206	8,764
g. Covered Payroll	$ 411,026	$ 394,325

* Totals may not add due to rounding
** Retired participants include retirees and surviving spouses
*** Market Value of Assets on January 1, 2017 plus $1 million receivable

*(all dollar amounts are in thousands)**	June 30, 2017
h. Annual Required Contribution (ARC) at Fiscal Year End	$ 322,954
i. Interest on Obligations	$ 49,817
j. ARC Adjustment with Interest	$ 46,034
k. Annual OPEB Cost at Fiscal Year End: (h) + (i) - (j)	$ 326,737
l. Commonwealth Contributions	$ 123,870
m. Increase in Obligations for Retiree Health Benefits: (k) - (l)	$ 202,867
n Obligations for Retiree Health Benefits	
(1) Beginning of Year	$ 996,340
(2) End of Year: (n.1) + (m)	$ 1,199,207

* Totals may not add due to rounding

Development of Unfunded Actuarial Accrued Liability

This section develops the Unfunded Actuarial Accrued Liability (UAAL), which is the actuarial accrued liability net of the actuarial value of plan assets. The actuarial accrued liability is the portion of the present value of future benefits (PVFB) accrued to date. The present value of future normal costs represents the portion of the PVFB expected to accrue in the future, based on the current population.

*(all dollar amounts are in thousands)**	January 1, 2017		January 1, 2015	
a. Present Value of Future Benefits				
(1) Active Participants	$	2,898,573	$	2,383,637
(2) Retired Participants**	$	3,305,767	$	2,243,461
(3) Total	$	6,204,340	$	4,627,098
b. Total Present Value of Future Normal Costs	$	1,328,968	$	1,096,083
c. Actuarial Accrued Liability: (a) - (b)	$	4,875,372	$	3,531,015
d. Actuarial Value of Assets***	$	88,297	$	80,217
e. Unfunded Actuarial Accrued Liability (UAAL): (c) - (d)	$	4,787,075	$	3,450,798

* Totals may not add due to rounding
** Retired participants include retirees and surviving spouses
*** Market Value of Assets on January 1, 2017 plus $1 million receivable

Determination of Annual Required Contribution

GASB 45 requires the disclosure of the annual postemployment benefits other than pensions ("OPEB") cost. A component of the annual OPEB cost is the Annual Required Contribution. The following is a brief explanation of the components of the Annual Required Contribution:

- Normal Cost: The portion of the Total Present Value of Future Benefits attributed to employee service during the current fiscal year by the actuarial cost method.
- Amortization Payments: Open, 30-year, amortization of the Unfunded Actuarial Accrued Liability as a level percent of payroll.
- Interest to End of Year: The Annual Required Contribution is determined as a year-end value. The Normal Cost and Amortization Payments are determined at the valuation date and have a full year of interest applied to determine the end of year value. The Annual Required Contribution is compared to the plan contributions (with interest) made during the year to determine the increase in the Net OPEB Obligation.

The table below presents the Annual Required Contribution development for the fiscal year ending June 30, 2017.

*(all dollar amounts are in thousands)**		**June 30, 2017**
a. Normal Cost**	$	105,169
b. Amortization of UAAL**	$	205,332
c. Interest to End of Year*** [(a) + (b)] x 5.00% + (e) x [5.00% / 2]	$	12,453
d. Annual Required Contribution as of June 30, 2017	$	322,954
e. Expected Benefit Payment	$	(122,870)

* Totals may not add due to rounding
** If Normal Cost and Amortization of Unfunded AAL are expressed on an end of year basis, their values are $108 million and $215 million.
*** Includes interest on expected benefit payments made throughout the year

Actuarial Experience

Actuarial gains and losses arise from experience different from that previously assumed, changes in actuarial assumptions and methods, and changes in program provisions.

*(all dollar amounts are in thousands)**

a. Unfunded liability as of January 1, 2015			$	3,450,798
b. Normal Cost for CY 2015	$	84,984		
c. Expected Benefit Payments for CY 2015	$	(109,240)		
d. Interest to January 1, 2016**	$	182,761		
e. Expected unfunded liability as of January 1, 2016			$	3,609,303
f. Normal Cost for CY 2016	$	87,448		
g. Expected Benefit Payments for CY 2016	$	(115,563)		
h. Interest to January 1, 2017**	$	191,046		
i. Contribution Receivable as of January 1, 2017	$	1,000		
j. Expected unfunded liability as of January 1, 2017			$	3,773,234
k. Increase (decrease) in plan liability due to plan change	$	-		
l. Increase (decrease) in plan liability due to assumption change	$	384,253		
n. (Gain)/loss due to experience	$	629,588		
o. Actual unfunded liability as of January 1, 2017			$	4,787,075

* Totals may not add due to rounding
** Includes interest on unfunded liability, normal cost, and expected benefit payments

10-Year Projection of Employer Benefit Payments

Presented in this section are the projected employer benefit payments for the next ten calendar years based on the program design as of January 1, 2017. These projected benefit payments are based on the actuarial assumptions shown in Appendix D. If actual experience differs from that expected by the actuarial assumptions, the actual employer benefit payments will vary from those presented below.

(all dollar amounts are in thousands)

Calendar Year		
2017	$	151,744
2018		163,449
2019		176,412
2020		190,642
2021		206,208
2022		222,461
2023		239,567
2024		256,377
2025		272,355
2026		288,410

Appendices

Appendix A – Plan Participation Summary

The participant data used in the valuation was provided by the Commonwealth as of December 31, 2016. While the participant data was checked for reasonableness, the data was not audited, and the valuation results presented in this report are dependent upon the accuracy of the participant data provided. The table below and on the subsequent page present a summary of the basic participant information for the active and retired participants covered under the terms of the Plan.

a. Active Participants	
Total Counts	4,299
Average Age	38.91
Average Service	12.64
b. Retired Participants*	
Counts	
Under Age 65 Non-Medicare	2,304
Over age 65 Non-Medicare	461
Over age 65 Medicare	2,142
Total Counts	4,907
Average Age	64.68
Total Participants	9,206

Retired Participants by Medicare Status			
	Single Contracts	Family Contracts	Total
Under Age 65			
Non-Medicare	260	2,044	2,304
Age 65 and over			
Non-Medicare	104	357	461
Medicare Part A only	265	1,480	1,745
Medicare	145	252	397

* Retired participants include retirees and 121 surviving spouses with minimal liability.

Distribution of Service Groups by Age Groups									
Age Group	**Retired Participants**	**Active Participants - Years of Service**							
		0 - 4	**5 - 9**	**10 - 14**	**15 - 19**	**20 - 24**	**25 - 29**	**30+**	**Total**
<20	-	-	-	-	-	-	-	-	-
20-24	-	139	-	-	-	-	-	-	139
25-29	1	627	77	-	-	-	-	-	704
30-34	1	262	342	181	1	-	-	-	786
35-39	2	77	138	332	66	-	-	-	613
40-44	13	17	57	185	291	120	1	-	671
45-49	536	-	12	98	215	588	128	1	1,042
50-54	839	-	-	14	49	138	91	18	310
55-59	591	-	1	-	5	2	9	17	34
60-64	321	-	-	-	-	-	-	-	-
65-69	609	-	-	-	-	-	-	-	-
70-74	1,109	-	-	-	-	-	-	-	-
75-79	509	-	-	-	-	-	-	-	-
80-84	192	-	-	-	-	-	-	-	-
85-89	135	-	-	-	-	-	-	-	-
90+	49	-	-	-	-	-	-	-	-
Total	**4,907**	**1,122**	**627**	**810**	**627**	**848**	**229**	**36**	**4,299**

Appendix B – Program Provisions Summary

This section summarizes overall eligibility provisions for postemployment medical coverage and the various plans offered by the Commonwealth.

Note that in some cases the benefit programs offered to retirees are different based on date of retirement. The provisions shown below summarize the plan designs for the most recent retirees. All older "grandfathered" plan designs are not shown in this document.

Eligibility

Permanent enlisted employees of the Pennsylvania State Police who retire from the state and meet one of the following eligibility criteria are eligible to receive RPSPP benefits

- Superannuation retirement (excluding vestees) – age 50 (age 55 for employees subject to Act 120 of 2010) with three years of service;
- Retirement with at least 25 years of service;
- Retirement with at least 20 but less than 25 years of service, with at least 10 years of enlisted service with State Police (Military time, civilian service and service with another agency are not considered service with the State Police);
- Disability retirement – no service requirement.

Covered Family Members

Spouses and dependents are eligible for postemployment medical coverage while the retiree is alive. The PPACA, signed into law on March 23, 2010, increased the dependent child age limit to age 26 and applied to the Commonwealth effective January 1, 2011.

Cost Sharing

The Commonwealth pays the full cost of postemployment medical, dental, and Part B coverage while the retiree is alive.

Surviving spouses of deceased retirees may continue to participate in the plan (receive medical, Rx, and Part B coverage, but not dental) if they pay the full cost of the coverage.

Appendix B – Program Provisions Summary (cont.)

Medical Plans

The following tables list the medical plans offered to retirees and provide the basic benefit provisions.

Medical	Benefit Provisions		Eligibility
PPO	**<u>In Network</u>**		Annuitants retired from the State Police and their eligible dependents
	Deductible	None	
	Out-of-Pocket Limit	None	
	Doctor Office Visits	PCP: $15 co-pay Specialist: $25 co-pay	
	Inpatient	Covered in full	
	Lifetime Maximum	None	
	<u>Out of Network</u>		
	Deductible	$250 Individual; $750 Family	
	Out-of-Pocket Limit	$1,500 Individual; $3,000 Family	
	Coinsurance	20%	
	Inpatient	20%	
	Lifetime Maximum	None	
Traditional Plan (Major Medical)	(Combined with Facility and Professional program)		Annuitants retired from the State Police and their eligible dependents
	<u>Retired prior to 7/1/07</u>		
	Deductible	$100 Individual $300 Family	
	Out-of-Pocket Limit (excluding deductible)	$380 Individual	
	Coinsurance	20%	
	Inpatient	20%	
	Lifetime Maximum	None	
	<u>Retired on or after 7/1/07</u>		
	Deductible	$250 Individual $750 Family	
	Out-of-Pocket Limit	$380 Individual	
	Coinsurance	20%	
	Inpatient	20%	
	Lifetime Maximum	None	
Traditional Plan (Facility Program)	(Combined with Professional and Major Medical program)		Non-Medicare eligible annuitants retired from the State Police and their non-Medicare eligible dependents
	Deductible	None	
	Out-of-Pocket Limit	N/A	
	Doctor Office Visits	N/A	
	Inpatient	Covered in full	
	Lifetime Maximum	N/A	

Appendix B – Program Provisions Summary (cont.)

Prescription Drug

The co-payments for all prescriptions covered by the plan are:

Retail: $5 Generic / $10 Preferred* / $15 Non-Preferred*

Mail Order: $10 Generic / $20 Preferred* / $30 Non-Preferred*

*Plus the cost difference between the brand and the generic, if one exists.

Medicare Part B Reimbursement

For employees hired on or after April 21, 1986, the Commonwealth reimburses the cost of Medicare Part B premium.

For employees hired before April 21, 1986, were not required to enroll in Medicare.

Dental

The basic benefit provisions are:

- Basic diagnostic and preventive work, restorations, endodontics, periodontics, oral surgery and prosthodontics: 100% UCR
- Orthodontics: 70% UCR (dependents under age 19 only)
- Orthodontics lifetime maximum for dependent children: $1,250

Changes in Plan Provisions

None.

Appendix C – Actuarial Methods

Actuarial Cost Method

The Actuarial Cost Method used to determine the Actuarial Accrued Liability and the Annual Required Contribution is the Entry Age Normal (EAN) Level Percent of Pay method. This actuarial cost method is one of the GASB 45 approved methods. This method is in the family of future benefit cost methods, which requires an estimate of the projected benefit payable at retirement to determine costs and liabilities.

The Normal Cost (NC) is the annual allocation required for each participant from entry date to the assumed retirement date so that the accumulated allocation at retirement is equal to the liability for the projected benefit. The projected benefits are based on estimates of future years of service and projected health benefit costs. The normal cost is developed as a level percent of pay.

The Present Value of Future Benefits is equal to the value of the projected benefit payable at retirement discounted back to the participant's current age. Discounts include such items as interest and mortality. The present value of future normal cost allocations is equal to the discounted value of the normal costs allocated from the participant's current age to retirement age.

The difference between the Present Value of Future Benefits and the present value of future normal cost allocations represents the Actuarial Liability at the participant's current age.

The Actuarial Accrued Liability for participants currently receiving payments is calculated as the actuarial present value of future benefits expected to be paid. No normal cost is allocated for these participants.

Actuarial Value of Assets

The actuarial value of assets on the valuation date is the market value of assets plus contributions receivable.

Method Changes Since Prior Valuation

None.

Appendix D – Actuarial Assumptions

Economic Assumptions

The economic assumptions were selected for consistency with SERS where applicable. The discount rate was selected based on the estimated long-term investment yield on the investments that are expected to be used to finance the payment of benefits. Since the benefits are assumed to be pay-as-you-go until the Trust Equivalent Arrangement is sufficient to fully fund the liability, a blend of the estimated long-term yield on the Trust Equivalent Arrangement and the Commonwealth's general assets were used.

Discount Rate	5.00%
Inflation[1]	2.60%
Payroll Growth[1]	2.90%
Salary Scale[1]	The career salary scale shown below includes average increases in the employee salary due to promotions and longevity growth. The average career salary growth is 2.65 percent per year. In addition, it is assumed that the salary schedules will increase by 2.90 percent per year. The scale below does not include the assumed 2.90 percent general salary increase.

Career Salary Scale for Members

Completed Years of Service	Annual Increase	Completed Years of Service	Annual Increase
1	6.00%	16	2.10%
2	4.50	17	2.05
3	4.00	18	2.00
4	3.75	19	1.95
5	3.50	20	1.90
6	3.25	21	1.85
7	3.00	22	1.75
8	2.90	23	1.65
9	2.80	24	1.55
10	2.70	25	1.45
11	2.60	26	1.25
12	2.50	27	1.05
13	2.40	28	0.90
14	2.30	29	0.85
15	2.20	30+	0.80

[1] For consistency with the pension plan of which these participants are members, these assumptions are based on those used for the SERS Actuarial Valuation Report as of December 31, 2016 and experience study presented to the Board in March 2016.

Appendix D – Actuarial Assumptions (cont.)

Demographic Assumptions

The demographic assumptions were selected for consistency with SERS where applicable. The retiree health specific assumptions were selected based on recent experience.

Mortality[1]

Pre-Retirement Mortality :

Age	Male	Female
20	0.04%	0.02%
25	0.04	0.02
30	0.05	0.02
35	0.06	0.03
40	0.09	0.04
45	0.13	0.06
50	0.24	0.09
55	0.29	0.14
60	0.35	0.24

Post Retirement Mortality:

Healthy Participants: The RP-2000 Male and Female Combined Healthy Mortality Tables projected (using Projection Scale AA) to 2016 for males and to 2020 for females, and then further adjusted to ensure sufficient margin improvement in certain age ranges. Each table includes a margin for future improvement in life expectancy.

Disabled Participants: The RP-2000 Male and Female Disabled Retiree Mortality Tables projected (using Projection Scale AA) to 2021 for males and to 2017 for females. Each table includes a margin for future improvement in life expectancy.

Disability Incidence[1]

Pre-Retirement Disability:

Age	Male	Female
25	0.02%	0.04%
30	0.06	0.09
35	0.11	0.14
40	0.17	0.19
45	0.30	0.30
50	0.42	0.45
55	0.55	0.57

Withdrawal[1]

Years of Service	Rate
0	9.0%
1	4.0
2	3.0
3	3.0
4	2.0
5	1.0
6	1.0
7	0.5
8	0.5
9	0.5
10+	0.2

[1] For consistency with the pension plan of which these participants are members, these assumptions are based on those used for the SERS Actuarial Valuation Report as of December 31, 2016 and experience study presented to the Board in March 2016.

Appendix D – Actuarial Assumptions (cont.)

Early Retirement[1] (based on early retirement as defined by SERS; retirement prior to OPEB eligibility, as described above in Appendix B, will receive no postemployment health benefit)	1.4% at each age
Normal Retirement[1] (based on normal retirement as defined by SERS; retirement prior to OPEB eligibility, as described above in Appendix B, will receive no postemployment health benefit)	See tables below
Spouse Age Difference[1]	Females are assumed to be 2 years younger than males.
Participation Rate	All eligible employees are required to participate in the active health plan and are assumed to elect coverage at retirement. Retirees who currently elect to waive their coverage are assumed to remain uncovered in the future.
Coverage Level Election Rates	Employees are assumed to maintain their current coverage election when they retire. Current retirees are assumed to continue their current coverage election.
Surviving Spouse Continuing Coverage	45% of spouses are assumed to elect to continue coverage after the retiree's death.

Normal Retirement[1]:

State Police with less than 19 years of service

Age	Rate
50 – 59	10.0%
60 – 64	10.0
65	27.0
66 – 79	32.0
80	100.0

State Police with at least 19 years of service

Years of Service	Rate
19* – 23	1.0%
24*	50.0
25	70.0
26-29	40.0
30	50.0
31-32	40.0
33 – 39	50.0
40+	100.0

* State Police with 19 and 24 years of service at the beginning of the year are assumed to retire at the point they reach 20 and 25 years respectively during the year and to receive the Fraternal Order of Police (FOP) award.

[1] For consistency with the pension plan of which these participants are members, these assumptions are based on those used for the SERS Actuarial Valuation Report as of December 31, 2016 and experience study presented to the Board in March 2016.

Appendix D – Actuarial Assumptions (cont.)

Benefit Assumptions

Per Capita Claims Costs

The per capita claims costs used in the valuation were developed from the self-insured rates that represent the expected claims costs and administrative expenses for 2017 for each plan. These first-year rates are on a “net basis” – they reflect plan costs after reduction of total benefit costs for member cost-sharing (deductibles, coinsurance, co-pays, provider savings, Medicare, etc.). Future year per capita costs were projected by applying trend assumptions to the first year costs.

The 2017 per adult member rates (by plan, and coverage category) and the current enrollment mix by plan, age and gender were used to develop net rates by age band. Rates were age-graded using the retiree age and gender distribution, separately for the non-Medicare eligible and Medicare population. These age-graded rates are the basis for projecting the gross cost for each individual, before member contributions for coverage. The aging factors are based on the Society of Actuaries age-curve study “Health Care Costs—From Birth to Death.”

Since the “flat” rates are specific to the experience of the Commonwealth’s retirees (i.e., not blended with employees) separately for non-Medicare and Medicare, , there is no implicit subsidy. However, age-graded claims costs were developed to project the increases in costs related to the average age of the retiree population increasing over time.

2017 Annual Per Capita Claims Costs

Age	Non-Medicare Eligible	Medicare Part A Eligible	Medicare Part A & B Eligible
45	$ 9,567	N/A	N/A
50	11,578	N/A	N/A
55	14,166	N/A	N/A
60	17,248	N/A	N/A
64	20,454	N/A	N/A
65	21,370	$ 17,414	$ 9,374
70	25,604	18,381	10,166
75	30,261	19,700	10,832
80	35,114	20,838	11,321
85	39,861	21,746	11,532
90	44,079	22,137	11,488
95	46,547	21,549	11,223

The table below illustrates calendar year 2017 annual medical, dental and Rx (net of retiree drug subsidy) “flat” net rates for each plan that are charged to eligible surviving spouses who pay the full cost of coverage. For purposes of developing the annual per capita claims costs, retiree drug subsidy for Medicare Part D was excluded, consistent with GASB Technical Bulletin No. 2006-1.

Non-Medicare	Per Adult Member Per Year
Traditional	$15,902.40
PPO	$13,899.48

Medicare	Per Adult Member Per Year
Traditional with Part A	$17,709.60
Traditional with Part A&B	$8,187.24
PPO with Part A	$17,709.60
PPO with Part A&B	$8,187.24

Dental	Per Adult Member Per Year
	$413.16

Expenses

Rates were developed to include administrative expenses as a component in the total rate.

Appendix D – Actuarial Assumptions (cont.)

Trend Rates

The trend rates illustrated below are used to project age-graded claims and flat rates into future years. Trend rates were developed based on the SOA-Getzen trend rate model version 2016_a. The short-term trend assumptions were based on a review of the Commonwealth's historical trend rates during the years 2014 through 2016 and emerging experience. Regression curves were fit to the data to help predict short-term future per capita cost increases. The SOA-Getzen model was then used to determine the trend rates beginning in 2022 and thereafter, based on the long-term inflation assumption and reasonable macro-economic assumptions for the growth of health care expenditures during this period relative to the general economy.

Year	All benefits
2017	6.0%
2018	5.9%
2019	5.8%
2020	5.7%
2021	5.6%
2022	5.5%
2030	5.5%
2040	5.4%
2050	4.9%
2060	4.7%
2070	4.2%
2075+	3.9%

Excise Tax

Effective in the 2020 calendar year, an excise tax on "Cadillac Plans" will apply as a result of PPACA. HMOs and other healthcare insurers, who offer plans with a higher cost than the excise tax threshold, will be charged a 40% tax on the costs exceeding the threshold. Due to the expectation that the medical trend rate will significantly exceed inflation over the long-term, most retiree health plans will be affected by the excise tax at some point in the future. After adjusting the thresholds for the age and gender characteristics of the Commonwealth's policy holders, however, the excise tax is projected to only have a minor impact on the liabilities. Claim costs are projected to exceed the excise tax threshold in year 2024.

Medicare Eligibility

Current non-Medicare retirees and spouses (if covered) over age 65 are assumed to remain non-Medicare eligible.

Current Medicare retirees and spouses (if covered) hired before April 21, 1986 are assumed to be eligible for Medicare Part A only.

Current non-Medicare retirees and spouses (if covered) under age 65 and hired before April 21, 1986 and all actives hired before April 21, 1986 are assumed to be split with 70% eligible for Medicare Part A only and 30% not eligible for Medicare. This is based on recent experience, which shows that 70% of pre-1986 hires are able to gain Medicare eligibility through a spouse or prior employment.

All other retirees and spouses (if covered) are assumed to be non-Medicare eligible prior to age 65 and Medicare eligible at age 65.

Coverage

Current retirees are assumed to remain in their currently elected plan.

Current employees are assumed to enroll at retirement in the same proportion as the current retiree mix. These proportions are established separately for non-Medicare and Medicare coverage.

The table below shows the enrollment percentage by plan.

Non-Medicare	Adult Member Enrollment
Traditional	33.2%
PPO	66.8%

Medicare	Adult Member Enrollment
Traditional with Part A	43.7%
Traditional with Part A&B	37.6%
PPO with Part A	11.1%
PPO with Part A&B	7.6%

Appendix D – Actuarial Assumptions (cont.)

Assumption Changes Since Prior Valuation

The following assumptions were updated based on those used for the SERS Actuarial Valuation Report as of December 31, 2016 and experience study presented to the Board in March 2016:

- Discount Rate
- Inflation
- Payroll Growth
- Salary Scale
- Mortality
- Disability incidence
- Withdrawal
- Early and Normal Retirement

Per capita claims cost were updated based on changes in the underlying claims and benefit provisions..

The trend rate was changed to use updated assumptions for short-term trend based on a review of the Commonwealth's historical trend rates; for long-term trend using Getzen Model version 2016_a and SERS' inflation assumption..

Appendix E – Rationale for Assumptions

Discount Rate	To select the discount rate, GASB No. 45 requires the use of the "estimated long-term investment yield on the investments that are expected to be used to finance the payment of benefits". In the case of the Commonwealth, there is currently a negligible amount in the OPEB Trust Fund with a plan to contribute $1 million annually until the plans are 100% funded. The plans are assumed to be pay-as-you-go until they are fully funded at which time the Trust Fund will be used to pay all future benefits. During the period in which benefits are not paid from the Trust Fund, GASB 45 requires the estimated long-term investment yield be based on the general assets of the employer. The general assets refer to any investments held by the employer that are not earmarked for a specific purpose (i.e. proprietary funds, capital projects, etc.) Therefore, we used a blend of the expected return on the Trust Fund and the general assets of the Commonwealth, which are invested in Pool 99/198.
Inflation, Payroll Growth, Salary Scale, Mortality, Disability Incidence, Withdrawal, Early and Normal Retirement	Consistent with the assumptions used for the SERS Actuarial Valuation Report as of December 31, 2016 and experience study presented to the Board in March 2016. The inflation assumption was selected by the SERS Board during an April of 2017 meeting based on a review of actual plan experience and the prevalent economic outlook.

Appendix F – Glossary

Below is a brief explanation of various terms used in this report.

- **Actuarial Accrued Liability (AAL).** The portion of the Present Value of Future Benefits that is attributed to accrued service as of the valuation date, based on the actuarial cost method.

- **Annual OPEB Cost.** The amount recognized by an employer in each accounting period for contributions to a defined benefit OPEB plan on the modified accrual basis of accounting.

- **Annual Required Contribution (ARC).** The employer's annual required contributions to an OPEB plan calculated in accordance with GASB 45.

- **Covered Payroll.** Annual compensation paid (or expected to be paid) to active employees covered by an OPEB plan, in aggregate.

- **Net OPEB Obligation (NOO).** The cumulative difference between the annual OPEB cost and employer contributions since the adoption date of GASB 45.

- **Normal Cost (NC).** The portion of the Total Present Value of Future Benefits attributed to employee service during the current fiscal year by the actuarial cost method.

- **Other Postemployment Benefits (OPEB).** Retiree health care benefits and postemployment benefits provided separately from a pension plan (excluding termination offers and benefits).

- **Present Value of Future Benefits (PVFB).** The value, as of the valuation date, of the projected benefits payable to all members for their accrued service and their expected future service, discounted to reflect the time value (present value) of money and adjusted for the probabilities of retirement, withdrawal, death and disability.

- **Unfunded Actuarial Accrued Liability (UAAL**). The portion of the Actuarial Accrued Liability that exceeds the current plan assets.