Office of the Superintendent of Financial Institutions Canada
Office of the Chief Actuary

Bureau du surintendant des institutions financières Canada
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Actuarial Report 19th

Pension Plans for the Canadian Forces

Regular Force and Reserve Force

as at 31 March 2019

Canada

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The Honourable Jean-Yves Duclos, P.C., M.P.
President of Treasury Board
Ottawa, Canada
K1A 0R5

Dear Minister:

Pursuant to section 6 of the *Public Pensions Reporting Act*, I am pleased to submit the report on the actuarial review as at 31 March 2019 of the Canadian Forces Pension Plans. This actuarial review is in respect of pension benefits and contributions of both the Regular Force Pension Plan and the Reserve Force Pension Plan. The Regular Force Pension Plan is established by Parts I, III and IV of the *Canadian Forces Superannuation Act*, includes the Canadian Forces-related benefits provided under the *Special Retirement Arrangements Act*, and is subject to the *Pension Benefits Division Act*. The Reserve Force Pension Plan is established by Part I.1 of the *Canadian Forces Superannuation Act* and subject to the *Pension Benefits Division Act.*

Yours sincerely,

Assia Billig, FCIA, FSA, PhD
Chief Actuary

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1 Executive Summary

This actuarial report on the pension plans for the Canadian Forces – Regular Force Pension Plan (Regular Force Plan) and the Reserve Force Pension Plan (Reserve Force Plan) was made pursuant to the *Public Pensions Reporting Act* (PPRA).

This actuarial valuation is as at 31 March 2019 and is in respect of the pension benefits and contributions defined by Parts I, III and IV of the *Canadian Forces Superannuation Act* (CFSA), the *Special Retirement Arrangements Act* (SRAA), which covers the *Retirement Compensation Arrangements* (RCA), and the *Pension Benefits Division Act* (PBDA) for members of the Regular Force Plan. This valuation is also in respect of the pension benefits and contributions defined by Part I.1 of the CFSA and the PBDA for members of the Reserve Force Plan.

The previous actuarial report was prepared as at 31 March 2016. The date of the next periodic review is scheduled to occur no later than 31 March 2022.

1.1 Purpose of the Report

The purposes of this actuarial valuation are to determine the state of the Regular Force Plan composed of the Canadian Forces Superannuation Account (Superannuation Account), the Canadian Forces Pension Fund (CFPF) and the Retirement Compensation Arrangements (RCA) Account, to determine the state of the Reserve Force Plan composed of the Reserve Force Pension Fund (RFPF), to determine the projected current service costs for the CFPF, the RFPF and the RCA Account as well as to assist the President of the Treasury Board in making informed decisions regarding the financing of the government's pension benefit obligation. This report may not be suitable for another purpose.

1.2 Valuation Basis

This report is based on pension benefit provisions enacted by legislation, summarized in Appendices A and B.

Contribution rates for Regular Force members for calendar years 2019 to 2021 (as approved by the Treasury Board) and for calendar year 2022 and beyond (estimated) have been updated since the last valuation and are assumed to be equal to the contribution rates of Group 1 contributors under the pension plan for the Public Service of Canada (PS pension plan).

Contribution rates for Reserve Force members are set by regulation.

The *Canadian Forces Superannuation Act* was amended by Bill C-97 which received Royal Assent on 21 June 2019. The amendment modified the rule regarding the non-permitted surplus, increasing the permitted surplus from 10% to 25% of liabilities. The regulations which outline the corresponding provisions for the Reserve Force Plan remain unchanged. There have been no other changes to the plan provisions of either plan since the previous valuation.

The Funding Policy for the Public Sector Pension Plans (Funding Policy) was approved by the Treasury Board in 2018. The policy provides guidance and rules to support prudent governance of the plans[1] and ensures that sufficient assets are accumulated to meet the cost of the accrued pension benefits. The methods, assumptions and results of this actuarial valuation are consistent with the provisions of the

[1] The plans refer to the Pension Plans for the Public Service of Canada, the Canadian Forces – Regular Force and Reserve Force and the Royal Canadian Mounted Police.

Funding Policy.

For the Regular Force Plan, the financial data on which this valuation is based are composed of:

- The CFPF invested assets that the government has earmarked for the payment of benefits for service since 1 April 2000;
- the Superannuation Account established to track the government's pension benefit obligations for service prior to 1 April 2000; and
- the RCA Account for benefits in excess of those that can be provided under the *Income Tax Act* limits for registered pension plans.

For the Reserve Force Plan, the financial data on which this valuation is based are composed of RFPF invested assets that the government has earmarked for the payment of benefits for Reserve Force service.

These pension assets and accounts balances are summarized in Appendix C.

The membership data are provided by the Department of Public Services and Procurement Canada (PSPC). Membership data and tests performed on them are summarized in Appendix D.

The valuation was prepared using accepted actuarial practices in Canada and is based on methods and assumptions summarized in Appendices E to H.

All actuarial assumptions used in this report are best-estimate assumptions and do not include any margin for adverse deviations. They are independently reasonable and appropriate in aggregate for the purposes of the valuation at the date of this report.

Actuarial assumptions used in the previous report were revised based on economic trends and demographic experience. A complete description of the assumptions is given in Appendices F to H. A summary of the ultimate economic assumptions used in this report and those used in the previous report is shown in the following table.

Table 1 Ultimate Best-Estimate Economic Assumptions

	31 March 2019	31 March 2016
Assumed level of inflation	2.00%	2.00%
Real increase in pensionable earnings	0.70%	0.80%
Real increase in YMPE and MPE[1]	1.00%	1.10%
Real rate of return on the Pension Fund	4.00%	4.00%
Real rate of return on the Superannuation Account and RCA Account	2.50%	2.70%

We have reflected the impacts of the COVID-19 pandemic on the economic assumptions used in this report. It is important to note that the pandemic is a very fluid situation that will likely continue to evolve for some time. We have estimated the impacts based on the information known at the time the report was prepared. The final impacts of this health and economic crisis will likely generate some differences in the future.

[1] Year's Maximum Pensionable Earnings and Maximum Pensionable Earnings.

1.3 Main Findings

Table 2 Main Results as at 31 March 2019[1]
($ millions)

	Superannuation Account	Canadian Forces Pension Fund	Reserve Force Pension Fund	RCA Account
Financial Position				
Recorded Balance/Actuarial Value of Assets	45,630	31,586	538	882
Actuarial Liability	48,057	31,007	711	727
Actuarial Excess(Shortfall)/Surplus(Deficit)	(2,427)	579	(173)	155
Current Service Costs for Calendar Year 2021				
Member Contributions	-	539.8	21.4	4.8
Government Current Service Cost	-	939.3	54.4	32.5
Total Current Service Cost/Credit	-	1,479.1	75.8	37.2
Special Credits/Payments in Plan Year 2021	2,605	-	17.4	-

1.3.1 Superannuation Account (Service prior to 1 April 2000)

As at 31 March 2019, the recorded balance of the Superannuation Account is $45,630 million and the actuarial liability for service prior to 1 April 2000[2] is $48,057 million. The resulting shortfall is $2,427 million.

In accordance with the CFSA, the actuarial shortfall could be amortized over a maximum period of 15 years beginning on 31 March 2021. If the shortfall is amortized over the maximum period, 15 equal annual credits of $251 million could be made to the Superannuation Account. The time, manner and amount of such credits are to be determined by the President of the Treasury Board.

It is expected that the government will eliminate the actuarial shortfall of the Superannuation Account by making a one-time credit of $2,605 million as at 31 March 2021 that takes into account the interest on the shortfall accumulated from 31 March 2019.

1.3.2 Canadian Forces Pension Fund (Service since 1 April 2000)

1.3.2.1 Current Service Cost

The estimated total current service cost, borne jointly by the contributors of the CFPF and the government, is $1,479.1 million for calendar year 2021. The estimated member contributions are $539.8 million and the estimated government contributions are $939.3 million for calendar year 2021. Administrative expenses are estimated at $16.1 million (included in the total current service cost) for calendar year 2021.

1 Numbers shown in the tables throughout this report may not add up due to rounding.
2 The actuarial liability for service prior to 1 April 2000 refers to the actuarial liability for service accrued prior to that date except for service elections since 1 April 2000. Service elections made on or after that date are deemed to be service accrued since that date.

The following table shows the projected current service cost expressed as a percentage of the expected pensionable payroll[1] and in millions of dollars for the three calendar years following the expected laying of this report. The ratio of government current service cost to the members current service cost is also shown. Projected current service costs shown in this table are based on the member contribution rates shown in Section 2.3.2.

Table 3 Canadian Forces Pension Fund Current Service Cost on a Calendar Year Basis

Calendar Year	Current Service Cost ($ millions)			Current Service Cost (% of pensionable payroll)			Ratio of Government to Contributors Current Service Cost
	Contributors	Government	Total	Contributors	Government	Total	
2021	539.8	939.3	1,479.1	9.98	17.36	27.34	1.74
2022	548.4	947.7	1,496.1	9.92	17.15	27.07	1.73
2023	558.5	958.7	1,517.2	9.86	16.93	26.79	1.72

1.3.2.2 Financial position and amortization of actuarial surplus (deficit)

As at 31 March 2019, the actuarial value of the assets in respect of the CFPF is $31,586 million and the actuarial liability is $31,007 million, resulting in an actuarial excess of $579 million. No special payments are required.

1.3.3 Reserve Force Pension Fund

1.3.3.1 Current Service Cost

The estimated total current service cost, borne jointly by the contributors to the RFPF and the government, is $75.8 million for calendar year 2021. The estimated member contributions are $21.4 million and the estimated government contributions are $54.4 million for calendar year 2021. Administrative expenses are estimated at $7.2 million (included in the total current service cost) for calendar year 2021.

Table 4 shows the projected current service cost expressed as a percentage of the expected pensionable payroll[1] and in millions of dollars for the three calendar years following the expected laying of this report. The ratio of government current service cost to the members current service cost is also shown. Projected current service costs shown in this table are based on the member contribution rates shown in Section 2.3.2.

Table 4 Reserve Force Pension Fund Current Service Cost on a Calendar Year Basis

Calendar Year	Current Service Cost ($ millions)			Current Service Cost (% of pensionable payroll)			Government to Contributors Ratio
	Contributors	Government	Total	Contributors	Government	Total	
2021	21.4	54.4	75.8	5.20	13.24	18.44	2.55
2022	22.4	56.3	78.7	5.20	13.05	18.25	2.51
2023	23.5	58.0	81.5	5.20	12.84	18.04	2.47

[1] Pensionable payroll, defined in Section A.5.1 of Appendix A, means the aggregate of pensionable earnings of all contributors with less than 35 years of service.

1.3.3.2 Financial position and amortization of actuarial surplus (deficit)

As at 31 March 2019, the actuarial value of the assets in respect of the RFPF is $538 million and the actuarial liability is $711 million, resulting in an actuarial deficit of $173 million.

In accordance with section 87 of the *Reserve Force Pension Plan Regulations*, the actuarial deficit is amortized with equal annual instalments over a period of 15 years. To amortize the actuarial deficit of $173 million, 15 equal annual special payments of $17.4 million are required to be made to the RFPF beginning on 31 March 2021, considering the special payment of $5.3 million that was made on 31 March 2020.

1.3.4 RCA Account

As at 31 March 2019, the balance of the RCA Account is $882 million and the actuarial liability is $727 million, resulting in an excess of $155 million.

The estimated RCA total current service cost, borne jointly by the contributors of the CFPF and the government, is $37.24 million for calendar year 2021 and is estimated to be $37.86 million and $38.30 million, respectively, for the following two calendar years.

Table 5 shows the projected current service cost expressed as a percentage of the expected pensionable payroll and the ratio of government current service cost to contributor current service cost for the three calendar years following the expected tabling of this report.

Table 5 RCA Current Service Cost on a Calendar Year Basis

	Current Service Cost ($ millions)			Current Service Cost (% of pensionable payroll)			Ratio of Government to Contributors Current Service Cost
Calendar Year	Contributors	Government	Total	Contributors	Government	Total	
2021	4.76	32.48	37.24	0.09	0.60	0.69	6.82
2022	4.98	32.88	37.86	0.09	0.60	0.69	6.60
2023	5.15	33.15	38.30	0.09	0.59	0.68	6.44

2 Valuation Results

This report is based on pension benefit provisions enacted by legislation, summarized in Appendices A and B, and the financial and membership data summarized in Appendices C and D. The valuation was prepared using accepted actuarial practices in Canada as well as methods and assumptions summarized in Appendices E to H. Emerging experience that differs from the corresponding assumptions will result in gains or losses to be revealed in subsequent reports.

Projections of the financial positions of the Superannuation Account, the CFPF and the RFPF are shown in Appendix I.

2.1 Financial Position

Beginning on 1 April 2000, member and government contributions of the Regular Force Plan are no longer credited to the Canadian Forces Superannuation Account. Rather, they are credited to the Canadian Forces Pension Fund, and the total amount of contributions net of benefits paid and administrative expenses is transferred to the Public Sector Pension Investment Board (PSPIB) and invested in the financial markets.

Contributions made by the government and members of the Reserve Force Plan are credited to the Reserve Force Pension Fund. The total amount of contributions net of benefits paid and administrative expenses is transferred to the PSPIB and invested in the financial markets

The valuation results of this section show the financial position as at 31 March 2019 for each financing arrangement under the CFSA. The results of the previous valuation are also shown for comparison.

2.1.1 Canadian Forces Superannuation Account

Table 6 State of the Canadian Forces Superannuation Account
($ millions)

	31 March 2019	31 March 2016
Assets		
Recorded Account balance	45,607	45,695
Present value of prior service contributions	23	23
Total Recorded Account Balance	45,630	45,718
Actuarial Liability		
Active contributors	4,153	6,045
Retirement pensioners	40,280	37,804
Disability pensioners	122	154
Surviving dependents	3,356	3,138
Outstanding payments	1	-
Administrative expenses	145	232
Pension Modernization cost	-	12
Total Actuarial Liability	48,057	47,385
Actuarial Excess/(Shortfall)	(2,427)	(1,667)

In accordance with the CFSA, the actuarial shortfall of $2,427 million could be amortized over a

maximum period of 15 years beginning on 31 March 2021. If the shortfall is amortized over the maximum period, 15 equal annual credits of $251 million could be made to the Superannuation Account. The time, manner and amount of such credits are to be determined by the President of the Treasury Board. It is expected that the government will amortize the actuarial shortfall through a one-time special credit to the Superannuation Account of $2,605 million as at 31 March 2021 that takes into account the interest on the shortfall accumulated from 31 March 2019 to 31 March 2021 .

2.1.2 Canadian Forces Pension Fund

Table 7 Financial Position - Canadian Forces Pension Fund
($ millions)

	31 March 2019	31 March 2016
Actuarial Value of Assets		
Market value of assets	33,123	23,168
Actuarial smoothing adjustment	(1,928)	(1,078)
Present value of prior service contributions	328	267
Amount receivable from Part I.1 - Rollover members	63	57
Remaining contributions for pre-2007 Reserve Force service	-	64
Total Actuarial Value of Assets	31,586	22,478
Actuarial Liability		
Active contributors	17,720	15,239
Contributors' pre-2007 Reserve Force service	-	56
Retirement pensioners	13,061	8,601
Disability pensioners	7	8
Surviving dependents	136	84
Outstanding payments	83	51
Pension Modernization cost	-	9
Total Actuarial Liability	31,007	24,048
Actuarial Surplus/(Deficit)	579	(1,570)

As at 31 March 2019, the actuarial value of assets in respect of the Pension Fund is $31,586 million and the actuarial liability is $31,007 million, resulting in an actuarial surplus of $579 million. No special payments are required.

If there exists a non-permitted surplus[1] in the CFPF, no further government contributions for current service cost are permitted until, in the opinion of the President of the Treasury Board, the non-permitted surplus no longer exists. The results of this valuation do not indicate the existence of a non-permitted surplus as at 31 March 2019.

[1] A non-permitted surplus exists when the amount by which assets exceed liabilities in the CFPF as determined by the actuarial valuation report referred to in section 56 of the CFSA or one requested by the President of Treasury Board is greater than 25 percent of the amount of liabilities as determined in that report.

2.1.3 Reserve Force Pension Fund

Table 8 Financial Position - Reserve Force Pension Fund
($ millions)

	31 March 2019	31 March 2016
Actuarial Value of Assets		
Market value of assets	613	505
Actuarial smoothing adjustment	(50)	(30)
Present value of prior service contributions	38	25
Remaining contributions for processed prior service	0	42
Remaining contributions for unprocessed prior service	0	28
Amount payable to Regular Force pension plan	(63)	(57)
Total Actuarial Value of Assets	538	513
Actuarial Liability		
Active contributors	481	370
Contributors' unprocessed prior service	0	30
Retirement pensioners	215	156
Disability pensioners	1	3
Surviving dependents	4	2
Outstanding payments	10	1
Pension modernization cost	0	4
Total Actuarial Liability	711	566
Actuarial Surplus/(Deficit)	(173)	(53)

In accordance with section 87 of the *Reserve Force Pension Plan Regulations*, the actuarial deficit is amortized with equal annual instalments over a period of 15 years. Taking into account the special payment of $5.3 million that was made on 31 March 2020, the actuarial deficit of $173 million could be amortized in 15 equal annual payments of $17.4 million beginning on 31 March 2021.

2.2 CFSA - Reconciliation of the Changes in Financial Position

Table 9 presents the reconciliation of the changes in financial positions of the Superannuation Account, CFPF and the RFPF. Explanations of the elements largely responsible for the changes follow the table.

Table 9 Reconciliation of the Financial Position - Account and Funds
($ millions)

	Superannuation Account	Canadian Forces Pension Fund	Reserve Force Pension Fund
As at 31 March 2016	(1,667)	(1,570)	(53.0)
Recognized investment gains as at 31 March 2016	n/a	1,078	30.0
Revised initial financial position as at 31 March 2016	(1,667)	(492)	(23.0)
Expected interest on initial financial position	(219)	(74)	(3.4)
Change in methodology	-	-	0.7
Retroactive changes to the population data	275	49	19.2
Special credits/payments	1,886	484	15.5
Net experience gains and losses	86	3,940	(38.7)
Revision of actuarial assumptions	(2,839)	(1,482)	(48.1)
Pay Restructuring as at 1 January 2019	n/a	n/a	(32.6)
Change in the amount receivable from Part I.1 - Rollover members	n/a	6	(6.0)
Change in the present value of administrative expenses	50	n/a	n/a
Change in the present value of prior service contributions	8	112	18.8
Change in Outstanding payments	(1)	(32)	(9.1)
Change - Pension Modernization cost	(6)	(4)	-
Recognition of remaining contributions for processed prior service	n/a	n/a	(16.0)
Unrecognized investment gains as at 31 March 2019	n/a	(1,928)	(50.4)
As at 31 March 2019	(2,427)	579	(173.1)

2.2.1 Recognized Investment Gains as at 31 March 2016

An actuarial asset valuation method that minimizes the impact of short-term fluctuations in the market value of assets was used in the previous valuation, causing the actuarial value of the CFPF assets to be $1,078 million less than their market value. The same actuarial asset valuation method was used for the RFPF, causing the actuarial value of the RFPF assets to be $30.0 million less than their market value.

2.2.2 Expected Interest on Revised Initial Financial Position

The amount of interest expected to accrue during the intervaluation period increased the revised shortfall by $219 million for the Superannuation Account, increased the revised deficit by $74 million for the Canadian Forces Pension Fund and increased the revised deficit by $3.4 million for the Reserve Force Pension Fund.

These amounts of interest were based on the Superannuation Account yields, the CFPF returns and the RFPF returns projected in the previous report for the three-year intervaluation period.

2.2.3 Retroactive Changes to the Population Data

The net impact of the retroactive changes to the population data received from PSPC has resulted in a decrease of $275 million in the Superannuation Account actuarial liabilities, a decrease of $49 million in the CFPF actuarial liabilities and a decrease of $19.2 million in the RFPF actuarial liabilities.

The decrease in the Superannuation Account actuarial liabilities is due to a significant change to the information pertaining to retirement pensioners between the information received at the previous valuation and the information received for this valuation.

2.2.4 Special Payments Made in the Intervaluation Period

A deficit of $1,667 million was reported in the Superannuation Account as at 31 March 2016. The government made a one-time credit of $1,813 million as at 31 March 2017 which resulted in an increase of $1,886 million in the recorded balance of the Account as at 31 March 2019.

A deficit of $1,570 million was reported in the CFPF as at 31 March 2016, and the government took the position to amortize this deficit over the 15 years starting on 31 March 2018. A total of $460 million of special payments were made to the CFPF during the intervaluation period that resulted in an increase of $484 million in asset after factoring the expected interest to 31 March 2019.

A deficit of $53.0 million was reported in the RFPF as at 31 March 2016 which was to be amortized over a period of 15 years in accordance with the *Reserve Force Pension Plan Regulations*. A total of $14.8 million of special payments were made to the RFPF during the intervaluation period that resulted in an increase of $15.5 million in asset after factoring the expected interest to 31 March 2019.

2.2.5 Experience Gains and Losses

Since the previous valuation, experience gains and losses have decreased the Superannuation Account actuarial shortfall by $86 million. The CFPF and the RFPF actuarial deficit have decreased by $3,940 and increased by $38.7 million respectively due to the experience gains and losses over the three-year intervaluation period. The main experience gain and loss items are described in Table 10.

Table 10 Experience Gains and Losses
($ millions)

	Superannuation Account	Canadian Forces Pension Fund	Reserve Force Pension Fund
Demographic experience (i)			
Terminations (return of contributions)	2	18	(1.5)
Terminations (deferred annuity)	(2)	(339)	6.1
Terminations (transfer value)	10	245	(173.5)[1]
Disabilities 3B (annuity)[2]	(9)	(231)	-
Rollover from Part I.1	-	72	-
Rehired pensioner members	13	6	1.8
Retirements (annuity)	164	86	1.1
Disabilities 3A (annuity)[2]	-	1	(0.9)
Non-disabled pensioner deaths	(68)	(3)	0.4
Deaths (annuity)	(9)	(16)	0.2
Widow(er) deaths	17	-	-
Disabled pensioner deaths	2	-	0.1
Total	**120**	**(161)**	**(166.2)**
Investment earnings (ii)	(44)	4,183	106.9
Economic salary increases (iii)	14	64	-
Cost/contributions difference (iv)	4	3	28.8
Change in service accrual (v)	-	(33)	n/a
Pension benefit division payments (vi)	(28)	(68)	n/a
Promotional and seniority increases (vii)	(32)	(45)	n/a
Expected/Actual earnings	n/a	n/a	(2.0)
Pension indexation (viii)	31	8	0.2
Administrative expenses	(1)	1	(7.2)
Expected/actual disbursements (ix)	43	(13)	3.2
YMPE increases	4	12	-
Miscellaneous	(25)	(11)	(2.4)
Net experience gains (losses)	**86**	**3,940**	**(38.7)**

(i) The demographic assumptions having a large impact are as follows:

- The actual number of members opting for a deferred annuity was greater than expected which resulted in an increase of $2 million in the actuarial liability of the Superannuation Account and an increase of $339 million in the CFPF. The actual number of members opting for a deferred annuity was less than expected which resulted in a decrease of $6.1 million in the actuarial liability of the RFPF.

[1] Include members exiting the Reserve Force plan due to a rollover. A rollover results in the same transfer of assets from the RFPF as if the member had elected to receive a Transfer Value.

[2] Any condition rendering a member of the Regular Force mentally or physically unfit to perform his or her duties. A member is discharged under Q. R. & O. 15.01 Article 3B when he or she is unable to perform the duties of his or her own occupation. A member is discharged under Q.R. & O. 15.01 Article 3A when he or she is unable to perform the duties of any occupation.

- The number of terminations with a transfer value was less than expected resulting in a decrease of $10 million in the Superannuation Account shortfall and a decrease of $245 million in the initial CFPF deficit. The number of terminations under the RFPF was more than expected resulting in an increase of $173.5 million in the initial RFPF deficit. A significant proportion of these RFPF terminations were for members rolling over to the Regular Force Pension Plan.
- The significant increase in the actual number of Disability 3B retirements above the projected number resulted in an increase in the actuarial liability of $9 million in the Superannuation Account and of $231 million in the CFPF.
- In light of the significant increase in the number of Disability 3B retirements, the number of retirements has decreased over the intervaluation period which resulted in a decrease of $164 million in the actuarial liability of the Superannuation Account and a decrease of $86 million in the actuarial liability of the CFPF.
- The mortality under the Canadian Forces Pension Plans worsened at ages above 75 for male officers and male other ranks and only improved below age 75 for male officers. The net impact resulted in an increase in the actuarial liabilities of $68 and $3 million for the Superannuation Account and the CFPF, respectively. No loss or gain were observed under the RFPF.
- The surviving spouse mortality worsened during the intervaluation period which resulted in a decrease of $17 million in the actuarial liability of the Superannuation Account. No loss or gain were observed under both the CFPF and RFPF.

(ii) The rates of interest credited to the Superannuation Account were marginally less than the corresponding projected Superannuation Account yields in the previous valuation. Consequently, the experience loss was $44 million. The investment return on both Pension Funds exceeded expectations during the intervaluation period. This resulted in an investment gain of $4,183 million for the CFPF and an investment gain of $106.9 million for the RFPF.

(iii) Economic salary increases during the intervaluation period were smaller than expected. This resulted in a decrease in the actuarial liability of $14 million in the Superannuation Account and of $64 million in the CFPF.

(iv) Higher than expected member and government contributions during the intervaluation period resulted in a gain of $4 million with respect to the Superannuation Account, a gain of $3 million with respect to the CFPF and a gain of $28.8 million with respect to the RFPF. The very large discrepancy in the RFPF is due to the processing of buybacks of pre-2007 Reserve Force service.

(v) Service accruals higher than expected increased the CFPF actuarial liability by $33 million.

(vi) The net impact of the divisions of pension due to marriage breakdown (amount paid out to the former spouse versus the actuarial liability released) accounted for a loss of $28 million in the Superannuation Account and an increase of $68 million in the CFPF actuarial deficit. The Reserve Force Plan is not impacted by pension divisions since no direction is provided under the *Pension Benefits Division Regulations* regarding the division of pension upon the marriage breakdown of member of the Reserve Force Plan.

(vii) Promotional and seniority salary increases were higher than expected at many ages resulting in an increase in the actuarial liability of $32 million in the Superannuation Account and of $45 million in the CFPF.

(viii) Pension indexation was as expected at 1 January 2017, less than expected at 1 January 2018 and more than expected at 1 January 2019 which resulted in a decrease in the actuarial liability of $31 million in the Superannuation Account, of $8 million in the CFPF and no impact in the RFPF.

(ix) Under the Superannuation Account, $43 million less than expected was paid in lump sum and annuity payments as well as $13 million more from the CFPF and $3.2 million less from the RFPF.

2.2.6 Revision of Actuarial Assumptions

Actuarial assumptions were revised based on economic trends and demographic experience as described in Appendices F and G. This revision has increased the Superannuation Account actuarial liability by $2,839 million, increased the CFPF actuarial liability by $1,482 million and increased the RFPF actuarial liability by $48.1 million. The impacts of these revisions are described in the following table and the most important items are discussed thereafter.

Table 11 Revision of Actuarial Assumptions
($ millions)

	Superannuation Account	Canadian Forces Pension Fund	Reserve Force Pension Fund
Economic assumptions			
Yields and Rates of return	(3,440)	(1,435)	(56.8)
Increases in average pensionable earnings and YMPE/MPE	38	335	4.8
Pension Indexation	323	113	2.3
Total	(3,079)	(987)	(49.7)
Age difference between spouses	4	-	-
Survivor mortality rates	125	18	0.7
Longevity improvement factors	(284)	(91)	(2.7)
Pensioner mortality rates	347	29	1.2
Disabled retirements 3B rates	(18)	(499)	-
Proportion of Disability 3B with Immediate CPP Offset	5	65	-
Proportion married at death	90	29	1.0
Pensionable retirements rates	(17)	(128)	(0.1)
Annuity reduction factors	(7)	(17)	-
Seniority and promotional salary increases	(5)	(105)	0.3
Proportion electing a deferred annuity	-	(43)	0.9
Assumptions related to children and students	1	2	-
Withdrawals rates	-	247	0.8
Disabled retirements 3A	-	1	(0.7)
Net impact of revision	(2,839)	(1,482)	(48.1)

The net impact of the revision of the assumptions is largely attributable to the changes in economic assumptions and:

- For the Superannuation Account, the plan year 2020 mortality rates for both pensioners and survivors resulted in a gain which was partially offset by the revised longevity improvement factors;
- For the CFPF, the new disabled retirement 3B assumptions;
- For the RFPF, the revised longevity improvement factors.

The following revisions were made to the economic assumptions used in the previous report:

- ultimate real increase in pensionable earnings decreased from 0.80% to 0.70%; and
- ultimate real increase in YMPE and MPE decreased from 1.10% to 1.00%; and
- ultimate real rate of return on the Superannuation Account and RCA Account decreased from 2.70% to 2.50%.

Details of the changes in economic assumptions are described in Appendix F.

Details of the changes in demographic assumptions, in particular in mortality rates, are described in Appendix G.

2.2.7 Change in the Present Value of Administrative Expenses for the Superannuation Account

The previous report annual administrative expense assumption of 0.75% of total pensionable payroll is reduced to 0.55% in this report. This decrease is based on average administrative expenses observed during the intervaluation period. The reduction of 0.2% of annual administrative expenses resulted in a decrease of $50 million of the Superannuation Account actuarial shortfall.

For plan year 2020, 50.2% of total administrative expenses are being charged to the Superannuation Account; it is assumed that the proportion charged to the Superannuation Account will reduce at the same rate of 2.5% per year as assumed in the previous valuation.

2.2.8 Change in the Present Value of Prior Service Contributions

The expected total government cost is shown in Table 24. The government is expected to make additional contributions in excess of the current service cost for members' prior service elections. The change in the present value of prior service contributions corresponds to members' elections since the last report where the members opted to pay for these elections by instalments. Members' prior service elections paid through instalments has the effect of increasing the Superannuation Account and the CFPF assets by $8 and $112 million respectively as well as increasing the RFPF assets by $18.8 million.

2.2.9 Unrecognized Investment Gains

An actuarial asset valuation method that minimizes the impact of short-term fluctuations in the market value of assets was also used for this valuation. The method, which is described in section E.2, resulted in an actuarial value of the CFPF and the RFPF assets that are $1,928 and $50.4 million less than their respective market values as at 31 March 2019.

2.3 CFSA - Cost Certificate

2.3.1 Current Service Cost

The details of the current service cost for plan year[1] 2020 and reconciliation with the 2017 current service cost are shown below.

Table 12 Current Service Costs for Plan Year 2020
($ millions)

	CFPF	RFPF
Members required contributions	528.9	19.3
Government current service cost	926.5	50.2
Total current service cost	1,455.4	69.5
Expected pensionable payroll	5,254.8	371.4
Total current service cost as % of expected pensionable payroll	27.70%	18.71%

Table 13 Reconciliation of Current Service Costs
(Percentage of pensionable payroll)

	CFPF	RFPF
For plan year 2017	25.86	17.48
Valuation methodology change	-	(0.41)
Retroactive changes to the population data	0.06	0.08
Expected current service cost change	(0.71)	(0.43)
Experience (gains)losses	(0.04)	(0.57)
Changes in assumptions		
Economic Assumptions	1.72	2.76
Withdrawals	(0.45)	(0.17)
Pensionable retirements	0.15	-
Annuity reduction factors	0.03	-
Proportion electing a deferred annuity	0.07	(0.07)
Disabled retirements 3A	-	0.02
Disabled retirements 3B	1.00	-
Mortality Rates	(0.15)	(0.03)
Longevity improvement factors	0.08	0.06
Seniority and promotional salary increases	0.20	0.01
Proportion married at death	(0.02)	(0.02)
Assumptions related to children and students	-	-
Administrative expenses	(0.10)	-
For plan year 2020	27.70	18.71

[1] Any reference to a given plan year throughout this report should be taken as the 12-month period ending 31 March of the given year.

2.3.2 Projection of Current Service Costs

The current service cost is borne jointly by the plan members and the government. The Regular Force member contribution rates are determined on a calendar year basis and they have been changed since the last valuation. Contribution rates are set equal to the contribution rates of Group 1 contributors under the PS pension plan. Contribution rates for the Reserve Force members are set by regulation. The contribution rates are as follows:

Table 14 Member Contribution Rates

	Regular Force		
Calendar Year	Below YMPE	Above YMPE	Reserve Force
2019	9.56%	11.78%	5.20%
2020	9.53%	11.72%	5.20%
2021	9.49%	11.67%	5.20%
2022	9.44%	11.62%	5.20%
2023	9.38%	11.58%	5.20%

Current service costs on a plan year basis, expressed in percentage of the projected pensionable payroll as well as in dollar amount are shown in Table 15 for Regular Force members and Table 16 for Reserve Force members. Member contributions and the government current service costs are also shown on a calendar year basis in the Executive Summary.

Table 15 Projection of Current Service Cost on a Plan Year Basis - CFPF

Plan Year	$ Millions			% of Pensionable Payroll			Split
	Members	Government	Total	Members	Government	Total	Members : Government
2020	528.9	926.5	1455.4	10.07	17.63	27.70	36% : 64%
2021	535.5	935.8	1471.3	10.02	17.51	27.54	36% : 64%
2022	542.0	939.7	1481.7	9.98	17.29	27.27	37% : 63%
2023	551.2	949.8	1501.0	9.92	17.09	27.00	37% : 63%
2024	562.5	960.1	1522.6	9.87	16.85	26.72	37% : 63%

Table 16 Projection of Current Service Cost on a Plan Year Basis - RFPF

Plan Year	$ Millions			% of Pensionable Payroll			Split
	Members	Government	Total	Members	Government	Total	Members : Government
2020	19.3	50.2	69.5	5.20	13.51	18.71	28% : 72%
2021	20.6	53.3	73.9	5.20	13.45	18.65	28% : 72%
2022	21.6	54.9	76.5	5.20	13.19	18.39	28% : 72%
2023	22.7	56.8	79.5	5.20	13.02	18.22	29% : 71%
2024	23.8	58.4	82.2	5.20	12.79	17.99	29% : 71%

2.3.3 Administrative Expenses

Based upon the assumptions described in Appendix G.2.3, the CFPF and the RFPF administrative expenses are included in the total current service costs. As for the previous report, the expected administration expenses exclude the PSPIB operating expenses as these are recognized implicitly through a decrease in the real rate of return. The estimated administrative expenses are shown in the following table:

Table 17 Administrative Expenses
($ millions)

Plan Year	Superannuation Account	CFPF	RFPF
2020	14.5	14.4	6.5
2021	14.0	15.4	6.9
2022	13.5	16.4	7.3
2023	13.1	17.5	7.6
2024	12.6	18.7	8.0

The Superannuation Account administrative expenses have been capitalized and increase the liability for service accrued prior to 1 April 2000.

2.3.4 Contributions for Prior Service Elections

Based on the valuation data and the assumptions described in Appendices F.2 and F.3 and recent statistical information provided by the PSPC, member and government contributions for prior service elections were estimated as follows:

Table 18 Estimated Contributions for Prior Service[1]
($ millions)

	Superannuation Account		CFPF		RFPF	
Plan Year	Members	Government	Members	Government	Members	Government
2020	1.6	1.6	15.2	26.2	3.6	3.6
2021	1.5	1.5	15.7	27.0	3.2	3.2
2022	1.4	1.4	16.2	27.6	3.1	3.1
2023	1.3	1.3	16.7	28.3	3.1	3.1
2024	1.2	1.2	17.3	28.9	3.1	3.1

2.4 Sensitivity of Valuation Results to Variations in Longevity Improvement Factors

This valuation assumes that the current mortality rates applicable to members of the Canadian Forces Pension Plans will improve over time in line with the longevity improvement assumption[2] contained in the 30th Canada Pension Plan (CPP) actuarial report.

Table 19 presents the effect of varying the longevity improvement assumptions on the actuarial liabilities as 31 March 2019 and the plan year 2020 current service cost. The best-estimate longevity improvement assumption is described in Table 62 of Appendix G.

1 There is no contribution for prior service to the RCA.

2 In this report 'longevity improvement assumption' is equivalent to the 'mortality improvement assumption' discussed in the 30th Actuarial Report on the Canada Pension Plan

Table 19 Sensitivity of Results to Variation in Longevity Improvement Factors

	Canadian Forces Pension Fund				Actuarial Liability as at 31 March 2019 ($ millions)					
	Canadian Forces Pension Fund		Reserve Force		Superannuation Account		Canadian Forces Pension Fund		Reserve Force	
	2020	Effect	2020	Effect		Effect		Effect	2020	Effect
Best-Estimate	**27.70**	**None**	**18.71**	**None**	**47,385**	**None**	**24,048**	**None**	**711**	**None**
- if 0%	26.71	(0.99)	17.71	(1.00)	45,241	(2,144)	23,131	(917)	681	(30)
- if ultimate 50% higher	27.92	0.23	18.96	0.25	47,600	215	24,216	168	717	6
- if ultimate 50% lower	27.46	(0.23)	18.45	(0.26)	47,170	(215)	23,876	(172)	705	(6)
- if kept at 2020 level	28.54	0.84	19.59	0.88	48,685	1,300	24,765	717	735	24

The sensitivity of the life expectancy at age 65 to the variation in longevity improvement factors is shown in Table 64.

2.5 Sensitivity to Variations in Key Economic Assumptions

The information required by statute, which is presented in the main report, has been derived using best-estimate assumptions regarding future demographic and economic trends. The key best-estimate assumptions, i.e. those for which changes within a reasonable range have the most significant impact on the long-term financial results, are described in Appendices F and G.

Given the length of the projection period and the number of assumptions required, it is unlikely that the actual experience will develop precisely in accordance with best-estimate assumptions that underlie the actuarial estimates. Individual sensitivity tests have been performed using alternative assumptions.

Table 20 presents the effect on the plan year 2 current service cost and the liabilities as at 31 March 2019 for the Regular Force Plan when key economic assumptions are varied by one percentage point per annum. Similarly, Table 21 presents the effect on the plan year 2020 current service cost and the liabilities for the Reserve Force Plan when key economic assumptions are varied by one percentage point per annum.

Table 20 Sensitivity of Results to Variations in Key Economic Assumptions- Regular Force

	Current Service Cost for Plan Year 2020 (% of pensionable payroll)		Actuarial Liability as at 31 March 2019 ($ millions)			
			Superannuation Account		Canadian Forces Pension Fund	
Assumption(s) Varied	2020	Effect		Effect		Effect
Best-Estimate	**27.70**	**None**	**48,057**	**None**	**31,007**	**None**
Investment yield						
- if 1% higher	22.47	(5.23)	42,265	(5,792)	26,278	(4,729)
- if 1% lower	34.91	7.21	55,290	7,233	37,220	6,213
Pension Indexation						
- if 1% higher	32.91	5.21	54,938	6,881	35,942	4,935
- if 1% lower	23.76	(3.94)	42,431	(5,626)	27,117	(3,890)
Salary, YMPE and MPE						
- if 1% higher	29.97	2.27	48,149	92	32,145	1,138
- if 1% lower	25.88	(1.82)	47,978	(79)	30,068	(939)
Inflation[1]						
- if 1% higher	27.15	(0.55)	47,907	(150)	30,710	(297)
- if 1% lower	28.31	0.61	48,227	170	31,351	344

Table 21 Sensitivity of Results to Variations in Key Economic Assumptions - Reserve Force

	Current Service Cost (% of Pensionable Payroll)		Actuarial Liability as at 31 March 2019 ($ millions)	
Assumption(s) Varied	2020	Effect		Effect
Best-Estimate	**18.71**	**None**	**711.1**	**None**
Investment yield				
- if 1% higher	15.95	(2.76)	599.1	(112.0)
- if 1% lower	22.61	3.90	863.1	152.0
Pension Indexation				
- if 1% higher	23.85	5.14	856.1	145.0
- if 1% lower	15.15	(3.56)	602.1	(109.0)
Salary, YMPE and MPE				
- if 1% higher	20.44	1.73	754.1	43.0
- if 1% lower	17.27	(1.44)	674.1	(37.0)
Inflation[1]				
- if 1% higher	18.62	(0.09)	707.1	(4.0)
- if 1% lower	18.81	0.10	715.1	4.0

[1] Change in inflation impacts nominal investment yield and salary, as well as pension indexation.

The differences between the results above and those shown in the valuation can also serve as a basis for approximating the effect of other numerical variations in a key assumption to the extent that such effects are linear.

2.6 RCA - Financial Position

This section shows the financial position of the RCA Account as at 31 March 2019. The results of the previous valuation are also shown for comparison.

Table 22 State of the RCA Account
($ millions)

	31 March 2019	31 March 2016
Recorded Account balance	443	392
Tax Credit (CRA Refundable tax)	439	382
Total Recorded Account Balance	**882**	**774**
Actuarial Liability		
Pensionable excess earnings		
• Active contributors	415	238
• Pensioners	264	163
Survivor Allowance		
• Active contributors	7	5
• Pensioners	41	35
Total Actuarial Liability	**727**	**441**
Actuarial Excess/(Shortfall)	**155**	**333**

The sum of the recorded balance of the RCA Account and the tax credit (CRA refundable tax) is $882 million; it exceeds the actuarial liability of $727 million by 21% as at 31 March 2019 (76% as at 31 March 2016). The SRAA does not allow for an adjustment to be made to the RCA Account that would allow the recorded balance to track the actuarial liability when there is an actuarial excess.

2.7 RCA - Current Service Cost

The projected current service cost, borne jointly by the members and the government, of 0.44% for plan year 2020 calculated in the previous valuation has increased to 0.68% of pensionable payroll in this valuation. The RCA current service cost for plan year 2020 is estimated to marginally increase to 0.69% of pensionable payroll over the following three years and reduced to 0.67% by plan year 2024 as shown the following table.

Table 23 RCA - Current Service Cost
($ millions)

	Plan Year				
Total current service cost	2020	2021	2022	2023	2024
Pensionable excess earnings	34.9	35.7	36.4	37.0	37.3
Survivor Allowance	0.9	1.0	1.0	1.0	1.1
Total	35.8	36.7	37.4	38.0	38.4
Member contributions	4.4	4.6	4.8	5.0	5.2
Government current service cost	31.4	32.1	32.6	33.0	33.2
Current service cost as % of total pensionable payroll	0.68%	0.68%	0.69%	0.68%	0.67%

2.8 Summary of Estimated Government Cost

The following tables summarize the estimated total government credit and cost on a plan year basis.

Table 24 Estimated Government Credit
($ millions)

	RCA Account	Superannuation Account		Total Government Credit
Plan Year	Current Service Cost	Total Prior Service Contributions	Special Credits	
2020	31.4	1.6	0.0	33.0
2021	32.1	1.5	2,605.0	2,638.6
2022	32.6	1.4	0.0	34.0
2023	33.0	1.3	0.0	34.3
2024	33.2	1.2	0.0	34.4

Table 25 Estimated Government Cost
($ millions)

	Current Service Cost		Total Prior Service Contributions		Special Payments	Total Government Cost
Plan Year	CFPF	RFPF	CFPF	RFPF	RFPF	
2020	926.6	50.2	26.2	3.6	5.3	1,011.9
2021	935.8	53.3	27.0	3.2	17.4	1,036.7
2022	939.6	54.9	27.6	3.1	17.4	1,042.6
2023	949.7	56.8	28.3	3.1	17.4	1,055.3
2024	960.1	58.4	28.9	3.1	17.4	1,067.9

3 Actuarial Opinion

In our opinion, considering that this report was prepared pursuant to the *Public Pensions Reporting Act,*

- the valuation data on which the valuation is based are sufficient and reliable for the purposes of the valuation;
- the assumptions used are individually reasonable and appropriate in aggregate for the purposes of the valuation; and
- the methods employed are appropriate for the purposes of the valuation.

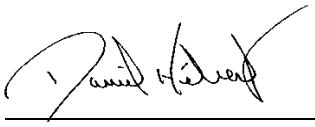
This report has been prepared, and our opinion given, in accordance with accepted actuarial practice in Canada. In particular, this report was prepared in accordance with the Standards of Practice (General Standards and Practice – Practice-Specific Standards for Pension Plans) published by the Canadian Institute of Actuaries.

We have reflected the impacts of the COVID-19 pandemic on the economic assumptions used in this report. It is important to note that the pandemic is a very fluid situation that will likely continue to evolve for some time. We have estimated the impacts based on the information known at the time the report was prepared. The final impacts of this health and economic crisis will likely generate some differences in the future.

In August 2020, the Treasury Board of Canada Secretariat communicated the Government of Canada's pension funding risk appetite for the public sector pension plans to the Public Sector Pension Investment Board (PSPIB). This communication could result in changes to the allocation of the PSPIB assets but the timing and the details of those potential changes are uncertain. It is expected that expected rates of returns on assets used in future actuarial reports for the Plans will reflect any changes in the asset allocation when they occur.

To the best of our knowledge, after discussion with the Department of National Defence, there were no other events between the valuation date and the date of this report that would have a material impact on the results of this valuation.

Assia Billig, FCIA, FSA
Chief Actuary



Daniel Hébert, FCIA, FSA

Christopher Dieterle, FCIA, FSA

Ottawa, Canada

30 September 2020

Appendix A — Summary of Pension Benefit Provisions

Pensions for members of the regular force were first provided under the Militia Pension Act of 1901, when in 1950 it became the *Defence Services Pension Act* until the *Defence Services Pension Continuation Act* and the *Canadian Forces Superannuation Act* (CFSA) were enacted in 1959. Benefits are also provided to members of the regular force under the *Special Retirement Arrangements Act*.

The enactment of Bill C-78 on 21 September 1999 gave authority to create a pension plan for the members of the reserve force. The Reserve Force Plan was established on 1 March 2007 and provides pension benefits to part-time members of the reserve force who meet the threshold requirements for becoming plan members. The benefit eligibility rules under this plan are the same as the rules that apply to Regular Force members starting on 1 March 2007.

Benefits under both the Regular Force Plan and the Reserve Force Plan may be reduced in accordance with the *Pension Benefits Division Act* if there is a breakdown of a spousal union.

Summarized in this appendix are the pension benefits, for both the Regular Force members and the Reserve Force members, provided under the CFSA registered provisions, which are in compliance with the *Income Tax Act*. For the Regular Force Plan, the portion of the benefits in excess of the *Income Tax Act* limits for the registered is provided under the RCA described in Appendix B.

The legislation shall prevail if there is a discrepancy between it and this summary.

A.1 Changes since the last valuation

The previous valuation report was based on the pension benefit provisions as they stood as at 31 March 2016. There were no changes to the plan provisions since the last valuation.

A.2 Membership

Regular Force membership in the Regular Force Plan is compulsory for all full-time members of the Canadian Forces.

As of 1 March 2007, a member of the reserve force is considered to be a member of the regular force and will become a member of the Regular Force Plan,

- on 1 March 2007 if, on that date,
  - the member's total number of days of paid Canadian Forces service during any period of 60 months beginning on or after 1 April 1999 was no less than 1,674,
  - the member already was or became a member of the Canadian Forces during the first month of the period and remained a member of the Canadian Forces throughout the period without any interruption of more than 60 days,
  - the member is not a person required to contribute to the Public Service Pension Fund or the Royal Canadian Mounted Police Pension Fund, and
  - the member does not have any pensionable service to their credit under Part I of the CFSA;
- in any other case, on the first day of the month following a period of 60 months ending after 1 March 2007 if

- the member's total number of days of paid Canadian Forces service during the period was no less than 1,674,
- the member already was or became a member of the Canadian Forces during the first month of the period and remained a member of the Canadian Forces throughout the period without any interruption of more than 60 days, and
- the member does not have any pensionable service to their credit under Part I of the CFSA.

The general rule is that, once a Reserve Force member is deemed a Regular Force member for the purposes of Part I of the CFSA and does not fail to receive pensionable earnings in any 12 consecutive months, the member remains a contributor under Part I of the CFSA as long as they remain a member of the Reserve Force. There are exceptions to the general rule previously described but for the purpose of this report, these were considered immaterial.

A member of the reserve force is deemed to become a participant in the Reserve Force Plan, defined under Part I.1 of the CFSA, if,

- during each of any two consecutive periods of 12 months beginning on or after 1 April 1999 and ending no later than 1 March 2007, the earnings that the member was entitled to receive were at least 10 per cent of the Annual Earnings Threshold[1], provided that the member already was or became a member of the Canadian Forces during the first month of the first period and remained a member of the Canadian Forces, without any interruption of more than 60 days, until 1 March 2007; or
- in any other case, on the first day of the month following two consecutive periods of 12 months, the second of which ending after 1 March 2007 and during each of which the earnings that they were entitled to receive were at least 10 per cent of the Annual Earnings Threshold, provided that the member already was or became a member of the Canadian Forces during the first month of the first period and remained a member of the Canadian Forces, without any interruption of more than 60 days, throughout those two periods.

A.3 Contributions

A.3.1 Members

For Regular Force members, during the first 35 years of pensionable service, members contribute according to the rates shown in the following table. The contribution rates shown after calendar year 2021 are not final and are subject to change. After 35 years of pensionable service, members contribute only 1% of pensionable earnings.

Table 26 Regular Force Member Contribution Rates

Calendar Year	2019	2020	2021	2022
Contribution rates on earnings up to the maximum covered by the Canada Pension Plan	9.56%	9.53%	9.49%	9.44%
Contribution rates on any earnings over the maximum covered by the Canada Pension Plan	11.78%	11.72%	11.67%	11.62%

[1] Annual Earnings Threshold is equal to the sum of 1/12 of the Year's Maximum Pensionable Earnings over any 12 month period.

For Reserve Force members, during the first 35 years of pensionable service, members contribute 5.2% on all earnings up to 66 2/3 times the defined benefit limit as determined under the Income Tax Regulations. After 35 years of pensionable service, members contribute only 1% of pensionable earnings.

A.3.2 Government

A.3.2.1 Current Service

The government determines its normal monthly contribution as that amount which, when combined with the required member contributions in respect of current service and expected interest earnings, is sufficient to cover the cost, as estimated by the President of the Treasury Board, of all future payable benefits that have accrued in respect of pensionable service during that month and the administrative expenses incurred during that month.

A.3.2.2 Elected Prior Service

The government matches Regular Force member contributions credited under the Superannuation Account for prior service elections; however, no contributions are credited if the member is paying the double rate.

Government credits to the Canadian Forces Pension Fund in respect of elected prior service are as described for current service; however, if the member is paying the double rate the government contribution rate is generally adjusted so that total member and government contributions match the current service cost.

For Reserve Force members, this valuation assumes that the government will match member contributions for prior service elections.

A.3.2.3 Actuarial Excess and Surplus

In accordance with the CFSA, the government has the authority to:

- debit the excess of accounts available for benefits over the actuarial liability from the Superannuation Account subject to limitations, and
- deal with any actuarial surplus, subject to limitations, in the Canadian Forces Pension Fund as it occurs, either by reducing members and/or employer contributions or by making withdrawals.

The regulations under Part I.1 of the CFSA give the government the authority to deal with any actuarial surplus, subject to limitations, in the RFPF as it occurs by reducing employer contributions.

A.3.2.4 Actuarial Shortfall and Deficit

In accordance with the CFSA, if an actuarial shortfall under the Superannuation Account is identified through a statutory actuarial report, the actuarial shortfall can be amortized over a period of up to 15 years, such that the amount that in the opinion of the President of the Treasury Board will, at the end of the fifteenth fiscal year following the tabling of that report or at the end of the shorter period that the President of the Treasury Board may determine, together with the amount that the President of the Treasury Board estimates will be to the credit of the Superannuation Account at that time, meet the

cost of the benefits payable in respect of pensionable service prior to 1 April 2000.

If an actuarial deficit under the CFPF is identified through a statutory actuarial report, the actuarial deficit can be amortized over a period of up to 15 years, such that the amount that in the opinion of the President of the Treasury Board will, at the end of the fifteenth fiscal year following the tabling of that report or at the end of the shorter period that the President of the Treasury Board may determine, together with the amount that the President of the Treasury Board estimates will be to the credit of the Canadian Forces Pension Fund at that time, meet the cost of the benefits payable in respect of pensionable service since 1 April 2000.

Similarly, if an actuarial deficit under the RFPF is identified through a statutory actuarial report, the RFPF is to be credited with such annual amounts that will fully amortize the actuarial deficit over a period of 15 years.

A.4 Summary Description of Benefits under the Regular Force Plan and the Reserve Force Plan

The objective of the Regular Force Plan and the Reserve Force Plan is to provide an employment earnings–related lifetime retirement pension to eligible members. Benefits to members in case of disability and to the spouse and children in case of death are also provided.

Regular Force member's pension benefits are coordinated with the pensions paid by the CPP. The initial rate of a Regular Force member's retirement pension is equal to 2% of the highest average of annual pensionable earnings over any period of five consecutive[1] years, multiplied by the number of years of pensionable service not exceeding 35. The pension is indexed annually with the Consumer Price Index (CPI) and the accumulated indexation may be payable at age 55 at the earliest as defined in Note A.5.6. Entitlement to benefits depends on either the qualifying service in the Canadian Forces or the pensionable service, as defined below in Notes A.5.7 and A.5.8.

Reserve Force member's pension benefits are equal to 1.5% of the greater of the Reserve Force member's total pensionable earnings and total updated pensionable earnings over the most recent 35 years of pensionable service (i.e. Updated Career Average Plan). The Reserve Force Plan also provides a bridge benefit equal to 0.5% of the greater of the pensioner's total bridge benefit earnings and total updated bridge benefit earnings over the most recent 35 years of pensionable service. Reserve Force pension and bridge benefits are indexed annually with the Consumer Price Index and the accumulated indexation may be payable at age 55 at the earliest, as defined in Note A.5.6.

Entitlement to benefits depends on either the qualifying service in the Canadian Forces or the pensionable service, as defined below in Notes A.5.7 and A.5.8.

Detailed notes on the following overview are provided in the following section.

[1] Any five-year period of pensionable service selected by or on behalf of the contributor, or during any period so selected consisting of consecutive periods of pensionable service totalling five years.

A.4.1 Regular Force Member Benefit Entitlement on the Basis of Qualifying Service

A.4.1.1 Active Regular Force Members

Type of Termination	Qualifying Service in the Canadian Forces *(Note A.5.7)*	Benefit
Retirement on completion of short engagement (an officer other than a subordinate officer who has not reached retirement age and is not serving on an intermediate engagement or for an indefinite period of service) *(Note A.5.9)*	Less than 2 years	Return of contributions *(Note A.5.11)*
	At least 2 but less than 25 years (less than 20 years – old terms of service)	At option of member (1) deferred annuity *(Note A.5.13)*; or (2) transfer value if under age 50 *(Note A.5.14)*
	25 years or more (20 years or more – old terms of service)	See "Retirement for reasons other than those previously mentioned"
Retirement during an indefinite period of service after having completed an intermediate engagement and prior to reaching retirement age, for reasons other than disability or, to promote economy or efficiency	Any length	Immediate annuity to which member was entitled upon completion of intermediate engagement increased to such extent as prescribed by regulation[1] *(Note A.5.15)*
Retirement on completion of intermediate engagement (a member who has not reached retirement age and is not serving for an indefinite period of service) *(Note A.5.10)*	25 years or more (20 years or more – old terms of service)	Immediate annuity *(Note A.5.12)*
Compulsory retirement because of disability[2]	Less than 2 years	Return of contributions *(Note A.5.11)*
	At least 2 but less than 10 years	At option of member (1) deferred annuity *(Note A.5.13)*; or (2) transfer value if under age 50 *(Note A.5.14)*
	10 years or more	Immediate annuity

1 The CFSA limits the annuity to the immediate annuity to which the active member would be entitled if retiring because of age or disability, and the formula in the CFS Regulations (Section A.5.16 always produces less than the maximum).

2 Any condition rendering a member of the Regular Force mentally or physically unfit to perform his or her duties. A member is discharged under Q. R. & O. 15.01 Article 3B when he or she is unable to perform the duties of his or her own occupation. A member is discharged under Q.R. & O. 15.01 Article 3A when he or she is unable to perform the duties of any occupation.

Type of Termination	Qualifying Service in the Canadian Forces *(Note A.5.7)*	Benefit
Compulsory retirement to promote economy or efficiency	Less than 2 years	Return of contributions
	More than 2 but less than 10 years	At option of member (1) deferred annuity *(Note A.5.13)*; or (2) transfer value if under age 50 *(Note A.5.14)*
	At least 10 but less than 25 years (less than 20 years – old terms of service)	At option of member (1) return of contributions; or (2) deferred annuity; or (3) transfer value if under age 50 *(Note A.5.14)* (4) with consent of the Minister of National Defence, an immediate reduced annuity *(Note A.5.16)*
	25 years or more (20 years or more – old terms of service)	Immediate annuity *(Note A.5.12)*
Retirement for reasons other than those previously mentioned	Less than 2 years	Return of contributions *(Note A.5.11)*
	At least 2 but less than 25 years (less than 20 years – old terms of service)	At option of member (1) deferred annuity *(Note* A.5.13); or (2) transfer value if under age 50 *(Note* A.5.14)
	(At least 20 but less than 25 years – old terms of service)	Immediate reduced annuity
	25 years or more	Officer: - immediate reduced annuity *(Note A.5.16)*; Other than officer: - immediate annuity *(Note A.5.12)*

A.4.1.2 Benefits in Case of Death of an Active Regular Force Member

Status at Death	Qualifying Service in the Canadian Forces (*Note A.5.7*)	Benefit
Leaving no eligible spouse or children under 25 (*Notes A.5.18 and A.5.19*)	Less than 2 years	Return of contributions
	2 years or more	Five times the annual amount of retirement pension to which the member would have been entitled at the date of death
Leaving eligible spouse and/or children under 25	Less than 2 years	Return of contributions or an amount equal to one month's earnings of the deceased member for each year of credited pensionable service, whichever is the greater
	2 years or more	Annual allowance (*Note A.5.20*)

A.4.1.3 Benefits in Case of Death of a Regular Force Pensioner

Status at Death	Benefit
Leaving no eligible spouse or children under 25	Minimum death benefit (*NoteA.5.21*)
Leaving eligible spouse and/or children under 25	Annual allowance (*Note A.5.20*)

A.4.1.4 Regular Force Member Benefit Entitlement on the Basis of Pensionable Service

Member's Type of Termination	Benefit
With two or more years of pensionable service; and	
▪ Involuntary termination due to a work force reduction program and	
– With 20 years of service or more – Age 50 or over and service 10 years of service or more	Immediate annuity (*Note A.5.12*)
▪ Leaving prior to age 50, except for death or disability	Deferred annuity (*Note A.5.13*) or Transfer Value (*Note A.5.14*)
▪ Leaving at age 50 or over, except for death or disability, and	
– Age 60 or over, or age 55 or over and service 30 years or more	Immediate annuity (*Note A.5.12*)
– Otherwise	Deferred annuity *(Note a.5.13)* or annual allowance (*Note A.5.20*)

A.4.2 Reserve Force Member Benefit Entitlement on the basis of "Pensionable" Service

Member's Type of Termination	Benefit
With less than two years of pensionable service	Return of contributions (*Note A.5.11)*
With two or more years of pensionable service; and	
▪ Involuntary termination due to a work force reduction program and	
– With 20 years of service or more	Immediate annuity (*Note A.5.12*)
– Age 50 or over and 10 years of service or more	
▪ Leaving prior to age 50, except for death, and	
- Because of disability	Immediate annuity (*Note A.5.12*)
- Otherwise	Deferred annuity (*Note A.5.13*) or Transfer Value (*Note A.5.14*)
▪ Leaving at age 50 or over, except for death or disability, and	
– Age 60 or over, or age 55 or over and service 30 years or more	Immediate annuity (*Note A.5.12*)
– Otherwise	Deferred annuity (*Note A.5.13*) or annual allowance (*Note A.5.20*)

A.4.3 Reserve Force Member Benefit Entitlement on the basis of "Qualifying" Service

Member's Type of Termination	Benefit
Retirement on completion of 25 years or more of Canadian Forces service *(Note A.5.7*)	Immediate annuity (*Note A.5.12*)

A.5 Explanatory Notes

A.5.1 Pensionable Earnings

For the Regular Force Plan, pensionable earnings means the salary at the annual rate prescribed by the regulations made pursuant to the *National Defence Act* together with the allowances for medical and dental care costs. Pensionable payroll means the aggregate pensionable earnings of all members with less than 35 years of pensionable service.

For the Reserve Force Plan, earnings means pay earned by a member of the Canadian Forces at the rates prescribed by the regulations made pursuant to the *National Defence Act* together with premiums in lieu of leave. Pensionable earnings means the earnings of a member with less than 35 years of pensionable service, who has completed the required two-year waiting period. Pensionable payroll means the aggregate pensionable earnings of all members.

A.5.2 Wage measure for Reserve Force Plan

Wage measure is

- for a calendar year prior to 2021 , the corresponding rate of pay shown in Table 67 of this report; and
- for a calendar year after 2020 , the greater of
  - the standard basic rate of pay for a period of duty or training of six hours or more, before any retroactive adjustment, that was prescribed or established under the *National Defence Act,* to be paid on October 1 of the preceding year to a member at the rank of Corporal (class A), and
  - the wage measure of the previous year.

A.5.3 Updated Pensionable Earnings for Reserve Force Plan

The updated pensionable earnings for a calendar year are the Reserve Force member's pensionable earnings for that year, subject to the *Income Tax Act* limits, times A/B, rounded to the nearest fourth decimal place, where

A = the average of the wage measures for five years consisting of the year the member most recently ceased to be a member and the most recent years during which the member was a member and, if necessary, the years preceding all of those years, and

B = the wage measure for that calendar year.

A.5.4 Bridge Benefit Earnings for Reserve Force Plan

Bridge benefit earnings for a calendar year are the lesser of

- the member's pensionable earnings for that year, and
- the Year's Maximum Pensionable Earnings (YMPE) for that year.

A.5.5 Updated Bridge Benefit Earnings for Reserve Force Plan

Updated bridge benefit earnings for a calendar year are the lesser of

- the member's updated pensionable earnings for that year, and
- the average of the YMPE for five years consisting of the year the member most recently ceased to be a member and the preceding four years.

A.5.6 Indexation for Regular Force Plan and Reserve Force Plan

A.5.6.1 Level of Indexation Adjustments

All immediate and deferred annuities (pensions and allowances) are adjusted every January to the extent warranted by the increase, as at 30 September of the previous year, in the 12-month average Consumer Price Index. If the indicated adjustment is negative, annuities are not decreased for that year; however, the next following adjustment is diminished accordingly.

A.5.6.2 First Indexation Adjustment

Indexation adjustments accrue from the end of the month in which employment or participation in the plan terminates. The first annual adjustment following termination of employment is prorated accordingly.

A.5.6.3 Commencement of Indexation Payments

Payment of the indexation portion of a retirement, disability or survivor pension normally commences when the pension is put into pay. However, regarding a retirement pension, the pensioner must be at least 55 years old and the sum of age and pensionable service at least 85; or the retirement pensioner must be at least 60 years old.

A.5.7 Qualifying Service in the Canadian Forces (Regular Force Plan and Reserve Force Plan)

Qualifying service in the Canadian Forces means service for which a Regular or Reserve Force member is paid, and includes:

- days of service in the Regular Force for which pay was authorized and periods of authorized leave of absence;
    - excluding any service for which a member was paid a return of contributions or lump sum payment under the CFSA that he or she did not elect to repay on subsequent enrolment;
- days of service in the Reserve Force for which pay was authorized and authorized absences for maternity and parental purposes:
    - days of training or duty of less than 6 hours = half-day
    - days of Class "A" service = 1.4 days
    - periods before 1 April 1999 (when duration of period is verifiable but not the number of days) = quarter time
    - during maternity and parental leaves, days of Canadian Forces service are based on service in previous 12 months

A.5.8 Pensionable Service

Pensionable service includes any period of service in the Regular Force or Reserve Force in respect of which an active member either (1) made contributions that remain in the Superannuation Account, CFPF or the RFPF, or (2) elected to contribute. It also includes any period of prior service for which an active member was paid a return of contributions or lump sum payment under the CFSA that he or she did elect to repay on subsequent enrolment. It also includes prior service in the Public Service of Canada, the Royal Canadian Mounted Police and the militaries of the Commonwealth of Nations that the member elected to count as pensionable service.

A.5.9 Short Engagement for Regular Force Plan

Short engagement means a continuous period of service as a commissioned officer in the regular force for a period not exceeding nine years.

A.5.10 Intermediate Engagement for Regular Force Plan

Intermediate engagement means, under the old terms of service, 20 years of continuous service as a member of the regular force. Under the new terms of service, an intermediate engagement is 25 years of continuous service as a member of the regular force.

A.5.11 Return of Contributions

Return of contributions means the payment of an amount equal to the accumulated current and prior service contributions paid or transferred by the member into the Superannuation Account, the CFPF or the RFPF together with interest. Interest is calculated at the quarterly Pension Fund rate each quarter on the accumulated contributions with interest as at the end of the previous quarter.

A.5.12 Immediate Annuity

For Regular Force Plan, immediate annuity means an unreduced pension that becomes payable immediately upon a pensionable retirement or a pensionable disability. The annual amount is equal to 2% of the highest average annual pensionable earnings (Note A.5.1) of the active member over any period of five[1] consecutive[2] years, multiplied by the number of years of pensionable service not exceeding 35. However, if such highest five-year earnings average exceeds the yearly maximum prescribed for the calendar year in which service is terminated, then the annual amount is reduced by 2% of such excess, multiplied by the number of years of pensionable service after April 1995.

When a regular force pensioner attains age 65 or becomes entitled to a disability pension from the CPP, the annual amount of pension is reduced by a percentage of the indexed CPP annual pensionable earnings[3] (or, if lesser, the indexed five-year pensionable earnings average on which the immediate annuity is based), multiplied by the years of CPP pensionable service[4]. The applicable percentage is

1 If the number of years of pensionable service is less than five, then the average is over the entire period of pensionable service.
2 Any five-year period of pensionable service selected by or on behalf of the contributor, or during any period so selected consisting of consecutive periods of pensionable service totalling five years.
3 Indexed CPP annual pensionable earnings means the average of the YMPE, as defined in the CPP, over the last five years of pensionable service, increased by indexation proportionate to that accrued in respect of the immediate annuity.
4 Years of CPP pensionable service, means the number of years of pensionable service after 1965 or after attaining age 18, whichever is later, but not exceeding 35.

0.625%.

For Reserve Force Plan, immediate annuity means an unreduced pension that becomes payable immediately upon a pensionable retirement or a pensionable disability. The annual amount is equal to 1.5% of the greater of the member's total pensionable earnings and total updated pensionable earnings over the most recent 35 years of pensionable service, plus an additional bridge benefit equal to 0.5% of the greater of the member's total bridge benefit earnings and total updated bridge benefit earnings.

For both plans, annuities are payable in equal monthly instalments in arrears until the end of the month in which the pensioner dies or when the disability pensioner recovers from disability. Upon the death of the pensioner, either a survivor allowance (Note A.5.20) or a minimum death benefit (Note A.5.21) may be payable.

A.5.13 Deferred Annuity

Deferred annuity means an annuity that becomes payable to a retirement pensioner when he or she reaches age 60. The annual payment is determined as for an immediate annuity (see Note A.5.12 above) but is adjusted to reflect the indexation (see Note A.5.6) from the date of termination to the commencement of annuity payments.

The deferred annuity becomes an immediate annuity during any period of disability beginning before age 60. If the disability ceases before age 60, the immediate annuity reverts to the original deferred annuity.

A.5.14 Transfer Value

Active members who, at their date of termination of pensionable service, are under age 50 and who are eligible for a deferred annuity may elect to transfer the commuted value of their benefits, determined in accordance with the regulations, to

- a locked-in Registered Retirement Savings Plan of the prescribed kind; or
- another pension plan registered under the *Income Tax Act*; or
- a financial institution for the purchase of a locked-in immediate or deferred annuity of the prescribed kind.

A.5.15 Annuity Payable upon Retirement During an Indefinite Period of Service for Regular Force Plan

For a regular force active member who has not reached retirement age and who, while on an indefinite period of service after completing an intermediate engagement, ceases to be a member of the regular force for any reason other than disability, or to promote economy or efficiency, the Canadian Forces Superannuation Regulations (CFSR) prescribe an annuity that is equal to the greater of

- an immediate annuity based on the pensionable service to the date of completion of the intermediate engagement only and the highest consecutive five-year earnings average at date of retirement, and

- an immediate annuity based upon the total pensionable service to the date of retirement and the highest consecutive five-year employment earnings average at that date reduced by 5% for each full year by which
  - in the case of an officer, the age at the date of retirement is less than the retirement age applicable to the member's rank; or
  - in the case of a member other than an officer, the age at the date of retirement is less than the retirement age applicable to the member's rank or the period of service in the Regular Force is less than 25 years, whichever is the lesser.

A.5.16 Reduced Immediate Annuity for Regular Force Members

Reduced immediate annuity means an immediate annuity for which the annual amount of the annuity as determined in Note A.5.12 is reduced as stated below.

With the consent of the Minister of National Defence, a regular force active member who is required to terminate to promote economy or efficiency and has between 10 and 20 years of service in the regular force may choose an immediate annuity reduced, until attainment of age 65 but not thereafter, by 5% for each full year not exceeding six by which

- the period of service in the regular force is less than 20 years; or
- the age of the active member at the time of retirement is less than the retirement age applicable to the member's rank,

whichever is the lesser.

A regular force active member who, not having reached retirement age, ceases to be a member of the regular force for any reason other than disability, or to promote economy or efficiency, or while on an indefinite period of service is entitled

- as an officer having served in the regular force for 20 years or more, to an immediate annuity reduced by 5% for each full year by which his or her age at the time of retirement is less than the retirement age applicable to his or her rank, or
- as other than an officer having served in the regular force for 20 years or more but less than 25 years, to an immediate annuity reduced by 5% for each full year by which
  - the period of service in the regular force is less than 25 years, or
  - the age at the time of retirement is less than the retirement age applicable to the member's rank,

whichever is the lesser.

When a Regular Force Plan pensioner in receipt of an immediate reduced annuity becomes disabled before reaching age 60, the pensioner ceases to be entitled to that immediate reduced annuity and becomes entitled to an immediate annuity adjusted in accordance with regulations to take into account the amount of any immediate reduced annuity which the pensioner may have received prior to becoming disabled.

A.5.17 Annual Allowance for Regular Force and Reserve Force Plan Members

Annual allowance for members means an annuity payable immediately on retirement or upon attaining age 50, if later. The amount of the allowance is equal to the amount of the deferred annuity to which the member would otherwise be entitled, reduced by 5% multiplied by the difference between 60 and the age when the allowance becomes payable.

However, if the member is at least 50 years old at termination, and has at least 25 years of pensionable service, then the difference is reduced (subject to the above as a maximum) to the greater of

- 55 minus the age, and
- 30 minus the number of years of pensionable service.

When a member in receipt of an annual allowance becomes disabled before reaching age 60, the annual allowance becomes an immediate annuity adjusted in accordance with regulations to take into account the amount of any annual allowance received prior to becoming disabled.

A.5.18 Eligible Surviving Spouse or Common-Law Partner

Eligible surviving spouse means the surviving spouse or common-law partner of an active member or pensioner except where

- the active member or pensioner died within one year of marriage, unless the Minister of National Defence is satisfied that the member's health at the time of the marriage justified an expectation of surviving for at least one year; or
- the pensioner married or began a common-law relationship at age 60 or over, unless after such marriage or partnership the pensioner either
  - became a plan contributor again, or
  - made an optional survivor benefit election within 12 months following the marriage to accept a reduced pension so that the new spouse would be eligible for a survivor pension. This reduction is reversed if and when the new spouse predeceases the pensioner or the spousal union is terminated for reason other than death; or
  - the pensioner is a female who retired before 20 December 1975 and did not make an optional survivor benefit election within the one-year period ending 6 May 1995.

A.5.19 Eligible Surviving Children

Eligible surviving children are all surviving children of an active member or pensioner who are either under age 18, or age 18 or over but under 25 and in full-time attendance at a school or university.

A.5.20 Annual Allowance for Eligible Survivors

For Regular Force Plan, annual allowance means, for the eligible surviving spouse or common-law partner and children of an active member or pensioner, an annuity that becomes payable immediately upon the death of that individual. The amount of the allowance, called a "basic allowance", is equal to 1% of the highest average of annual pensionable earnings of the active member over five consecutive years, multiplied by the number of years of pensionable service not exceeding 35.

The annual allowance for a spouse or a common-law partner is equal to the basic allowance except in the case where the spouse became eligible to a survivor pension as a result of an optional survivor benefit election, in which case it is equal to the percentage of the basic allowance specified by the pensioner making the election.

The annual allowance for an eligible surviving child is equal to 20% of the basic allowance, subject to a reduction if there are more than four eligible surviving children in the same family. The annuity otherwise payable to an eligible surviving child is doubled if the child is an orphan.

Annual allowances are not coordinated with the CPP and are payable in equal monthly instalments in arrears until the end of the month in which the survivor dies or otherwise loses eligibility. If applicable, a residual benefit (Note A.5.21) is payable to the estate upon the death of the last survivor.

For Reserve Force Plan, annual allowance means, for the eligible surviving spouse or common-law partner and children of a member or pensioner, an annuity that becomes payable immediately upon the death of that individual. The amount of the annual allowance, called a basic allowance, is equal to

- 1% of the greater of the pensioner's total pensionable earnings and total updated pensionable earnings; or,
- if the member was in receipt of an annual allowance at the time of death, an amount equal to A × B / C where:
  - A = the amount calculated under paragraph (a),
  - B = the amount of the annual allowance, and
  - C = the amount of the deferred annuity to which the pensioner was entitled.
- Each eligible surviving child of a member is entitled to receive,
  - if the member died leaving an eligible surviving spouse, an allowance equal to 1/4 of the basic allowance or, if there are more than two children, to an annual allowance equal to 1/2 of the basic allowance divided by the number of children; or
  - if the member died without leaving an eligible surviving spouse, and
    - there are fewer than four children, an annual allowance equal to 1/2 of the basic allowance, or
    - there are more than three children, an annual allowance equal to 1.5 times the basic allowance divided by the number of children.
  - The proportion of the basic allowance that constitutes the annual allowance shall be revised when the number of children who are entitled changes

.

A.5.21 Minimum Death Benefit

If upon the death of an active member there is no person to whom an allowance provided under the terms of the CFSA may be paid, or if the persons to whom such allowances may be paid die or cease to be entitled thereto and no other amount may be paid to them, then it is paid to the estate of the active member or to the named beneficiary under CFSA Part II, if any exists

- for an active member who was not a member of the Regular Force or the Reserve Force on or after 20 December 1975, any amount by which the amount of return of contributions exceeds the aggregate of all amounts paid to those persons and to the active member ;
- for an active member who was a member of the Regular Force or the Reserve Force on or after 20 December 1975, an amount equal to the greater of a return of contributions and an amount equal to five times the basic annuity in (including the bridge benefit for the Reserve Force member) to which the active member was or would have been entitled at the time of his or her death exceed the aggregate of all amounts paid to those persons and to the contributor.

A.5.22 Division of Pension in Case of Spousal Union Breakdown

In accordance with the *Pension Benefits Division Act* (PBDA), upon the breakdown of a spousal union (including common-law partnership), a lump sum can be transferred upon application supported by a court order or by mutual consent agreement, from the amounts in the Superannuation Account, the CFPF and the RFPF to the credit of an active member or pensioner. As at the transfer date, the maximum transferable amount is half the value of the retirement pension accrued by the active or former member during the period of cohabitation. If the member's benefits are not vested, the maximum transferable amount corresponds to half the member's contributions made during the period subject to division, accumulated with interest at the rate applicable on a refund of contributions. The benefits of the active member or pensioner are then reduced accordingly. As of 31 March 2019, the *Pension Benefits Division Regulations* does not provide the necessary directions to account for the different benefit provisions under the Reserve Force Plan. Hence, the pension accrued for a member of the Reserve Force Plan cannot be divided upon a breakdown of a spousal union at this time.

A.5.23 Rollovers

Certain members who cease to participate in the Reserve Force Plan subsequently become participants in the Regular Force Plan. As described in section 10.2 of CFSR, any period of pensionable service which is to a member's credit under the Reserve Force Plan on the day before the day on which that member becomes a contributor to the Regular Force Plan is rolled over to the Regular Force Plan. Whenever a rollover occurs, the actuarial liability associated with the member under the Reserve Force Plan is immediately extinguished and a new actuarial liability is immediately established under the Regular Force Plan.

There are two main scenarios in which a rollover of service from the Reserve Force Plan to the Regular Force Plan would arise. In the first scenario a member of Reserve Force makes a successful application to join the Regular Force. The member's transfer from the Reserve Force to the Regular Force triggers the rollover of service. In the second scenario the member begins to contribute to the Regular Force Plan by virtue of meeting the criteria described in section 8.1(1) (d) of the CFSR. This occurs upon the completion of a minimum of 55 months of Canadian Forces service within a period of 60 consecutive

months. The member remains in the Reserve Force but is considered to be a member of the Regular Force for the purposes of Part I of the CFSA and the CFSR.

Following a rollover the actuarial liability is removed from Reserve Force Plan and created under the Regular Force Plan and assets are transferred from the RFPF to the CFPF. For members who are not vested when the rollover occurs, PSPC calculates the amount to transfer between the pension funds in the same manner as a return of contributions. For members who are vested when the rollover occurs, PSPC calculates the amount to transfer between the pension plans as the commuted value of the accrued pension at age 60.

Appendix B — RCA Benefit Provisions under the Regular Force Plan

This appendix describes the Canadian Forces pension benefits financed through RCA rather than through the CFSA registered provisions using the Superannuation Account and the CFPF. As described below, RCAs are pension plans not subject to the benefit limitations that apply to registered pension plans because they are taxed on a current rather than on a deferred basis.

Effective 1 May 1995, RCA was established pursuant to the SRAA to provide for all pension benefits in excess of those that may be paid under the CFSA but are limited to be in accordance with the *Income Tax Act* restrictions on registered pension plans.

The following benefits are currently provided under a RCA to the extent that they are in excess of the *Income Tax Act* limits.

Benefit	CFSA Registered Provisions limit
Survivor allowance for service from 1 January 1992 onward (see A.5.20)	Pre-retirement death • Maximum spouse allowance is two-thirds of the greater of A and B; and • Maximum aggregate dependants' allowance is the greater of A and B, where A is the amount of member annuity earned to date of death, and B is the hypothetical amount of member annuity earned to age 65 where the average annual salary is limited to 1.5 times the average YMPE Post-retirement death The amount of spouse allowance is limited in any year to a maximum of two-thirds the retirement benefit that would have been payable to the member in that year.
Minimum lump sum death benefit (see A.5.21)	Pre-retirement death The amount of pre-retirement death benefit where the member has no eligible dependants is limited to the greater of the member contributions with interest and the present value of the member's accrued benefits on the day prior to death. Post-retirement death If the member has no eligible dependants at retirement, then the minimum death benefit is limited to the member contributions with interest.
Excess pensionable earnings (provided since 1 May 1995 for service since then)	The highest consecutive average pensionable earnings is subject to a prescribed yearly maximum that varies by calendar year and the registered plan's benefit formula. The calendar year 2020 Maximum Pensionable Earnings was $173,000 for the Regular Force Plan.

Appendix C — Assets, Accounts and Rates of Return

C.1 Assets and Accounts Available for Benefits

The government has a statutory obligation to fulfill the pension promise enacted by legislation to members of the Canadian Forces. Since 1 April 2000, the government has earmarked invested assets to meet the cost of pension benefits under the CFPF. For the RFPF, the government has earmarked invested assets since its inception on 1 March 2007.

With respect to the unfunded portion of the Regular Force Plan, accounts available for benefits were established to track the government's pension benefit obligations such as the Superannuation Account, for service prior to 1 April 2000, and the RCA Account for benefits in excess of those that can be provided under the Income Tax Act limits for registered pension plans.

C.2 Canadian Forces Superannuation Account

Regular Force Plan member contributions, government costs and benefits earned up to 31 March 2000 are tracked entirely through the CFSA Superannuation Account, which forms part of the Accounts of Canada.

The Superannuation Account was credited with all Regular Force member contributions and government costs prior to 1 April 2000, as well as with prior service contributions and costs for elections made prior to 1 April 2000 for periods before 1 April 2000 but credited after that date. It is charged with both the benefit payments made in respect of service earned under the Superannuation Account and the allocated portion of the plan administrative expenses.

The Superannuation Account is credited with interest as though net cash flows were invested quarterly in 20-year Government of Canada bonds issued at prescribed interest rates and held to maturity. No formal debt instrument is issued to the Superannuation Account by the government in recognition of the amounts therein. Interest is credited every three months on the basis of the average yield for the same period on the combined Superannuation Accounts of the Public Service, Canadian Forces and RCMP pension plans.

Table 27 Reconciliation of Balances in Superannuation Account
($ millions)

Plan Year	2017	2018	2019	2017 -2019
Public Accounts opening balance	45,697	45,209	46,357	45,697
INCOME				
Net Interest earnings	1,977	1,844	1,787	5,608
Employer contributions	2	2	2	6
Member contributions	3	3	2	8
Transfers received	-	1,813	-	1,813
Actuarial liability adjustments	-	-	-	-
Subtotal	1,982	3,662	1,791	7,435
EXPENDITURES				
Annuities	2,415	2,470	2,501	7,386
Pension divisions	22	26	22	70
Return of contributions	-	-	-	-
Pension transfer value payments	3	1	2	6
Transfers to other pension plans	-	-	-	-
Minimum benefits	-	-	-	-
Administrative expenses	*30*	*17*	*16*	*63*
Subtotal	2,470	2,514	2,541	7,525
Public Accounts closing balance	45,209	46,357	45,607	45,607

Since the last valuation, the Superannuation Account balance has decreased by $90 million (a 0.2% decrease) to reach $45,607 million as at 31 March 2019.

C.3 Canadian Forces Pension Fund (CFPF)

Since 1 April 2000, Regular Force contributions (except for prior service elections made prior to 1 April 2000) have been credited to the CFPF. The CFPF is invested in the financial markets with a view to achieving maximum rates of return without undue risk.

The CFPF has been credited with all Regular Force contributions since 1 April 2000, as well as with prior service contributions in respect of elections made since that date. The Pension Fund is also credited with the net investment returns generated by the capital assets managed by the Public Sector Pension Investment Board (PSPIB). It is debited with both the benefit payments made in respect of service earned and prior service elections made since 1 April 2000 and the allocated portion of the plan administrative expenses.

Table 28 Reconciliation of Balances in Canadian Forces Pension Fund
($ millions)

Plan Year	2017	2018	2019	2017 -2019
Opening balance	23,168	26,826	30,310	23,168
INCOME				
Net Investment Earnings	2,995	2,665	2,188	7,848
Employer contributions	711	826	796	2,333
Member contributions	470	574	541	1,585
Transfers received	36	69	69	174
Actuarial liability adjustments	170	145	145	460
Subtotal	4,382	4,279	3,739	12,400
EXPENDITURES				
Annuities	514	598	685	1,797
Pension divisions	25	37	36	98
Return of contributions	1	2	2	5
Pension transfer value payments	160	138	186	484
Transfers to other pension plans	1	5	2	8
Minimum benefits	1	1	1	3
Administrative expenses	22	14	14	50
Subtotal	724	795	926	2,445
Closing balance	26,826	30,310	33,123	33,123

Since the last valuation, the CFPF balance has increased by $9,955 million (a 43.0% increase) to reach $33,123 million as at 31 March 2019.

C.4 Canadian Forces RCA Account

The amount in the RCA account available for benefits is composed of the recorded balance in the RCA Account, which forms part of the Public Accounts of Canada, and a tax credit (CRA refundable tax). Each calendar year, a debit is made from the RCA Account such that in total roughly half of the recorded balances in the Account are held as a tax credit (CRA refundable tax).

No formal debt instrument is issued to the RCA Account by the government in recognition of the amounts therein. Interest is credited every three months on the basis of the average yield for the same period on the combined Superannuation Accounts of the Public Service, Canadian Forces and RCMP pension plans.

Table 29 Reconciliation of Balances in RCA Account
($ millions)

Plan Year	2017	2018	2019	2017 -2019
Public Accounts opening balance	392.1	409.2	430.2	392.1
INCOME				
Net Interest earnings	17.6	17.6	17.0	52.2
Employer contributions	25.3	33.5	18.1	76.9
Member contributions	2.4	3.7	3.4	9.5
Subtotal	45.3	54.8	38.5	138.6
EXPENDITURES				
Annuities	6.9	7.8	9.5	24.2
Pension divisions	0.4	1.7	0.6	2.7
Pension transfer value payments	0.7	1.2	2.5	4.4
Minimum benefits	0.0	0.0	0.0	0.0
Amount transfer to CRA	20.2	23.1	13.5	56.8
Subtotal	28.2	33.8	26.1	88.1
Public Accounts closing balance	409.2	430.2	442.6	442.6
Refundable tax	402.4	425.5	439.0	439.0

Since the last valuation, the RCA Account balance has grown by $50.5 million (a 12.9% increase) to reach $442.6 million as at 31 March 2019, and the refundable tax, totalling $382.2 million as at 31 March 2016, has increased by $56.8 million (a 14.9% increase) to reach $439.0 million as at 31 March 2019.

C.5 Reserve Force Pension Fund (RFPF)

Since 1 March 2007, Reserve Force member contributions (for current and prior service) have been credited to the RFPF. The Fund is invested in the financial markets with a view to achieving maximum rates of return without undue risk.

The RFPF has been credited with all contributions as well as with the net investment returns generated by the capital assets managed by the PSPIB. It is debited with benefit payments and plan administrative expenses.

Table 30 Reconciliation of Balances in Reserve Force Pension Fund
($ millions)

Plan Year	2017	2018	2019	2017-2019
Opening Balance	504.9	564.0	604.9	504.9
INCOME				
Net Investment Earnings	71.0	61.1	49.0	181.1
Employer contributions	33.5	45.8	40.6	119.9
Member contributions	19.4	28.4	21.0	68.8
Actuarial liability adjustments	4.2	5.3	5.3	14.8
Subtotal	128.1	140.6	115.9	384.6
EXPENDITURES				
Annuities	6.9	8.4	9.2	24.5
Return of contributions	0.1	0.1	0.1	0.3
Pension transfer value payments	14.9	13.8	21.6	50.3
Transfers to other pension plans	35.8	69.2	68.9	173.9
Minimum benefits	-	0.2	0.2	0.4
Administrative expenses	11.3	8.0	7.4	26.7
Subtotal	69.0	99.7	107.4	276.1
Closing Balance	564.0	604.9	613.4	613.4

Since the last valuation, the Fund balance has increased by $108.5 million (a 21.5% increase) to reach $613.4 million as at 31 March 2019.

C.6 Interest Earnings/ Rates of Return

The interest earnings in respect of the Superannuation Account were calculated using the entries in Table 27 which are based on book values since the notional bonds are deemed to be held to maturity. The interest earnings were computed using the dollar-weighted approach and assume that cash flows occur in the middle of the plan year (except for actuarial liability adjustments, which occur on 31 March). The CFPF and the RFPF rates of return are those from the PSPIB 2020 Annual Report.

Table 31 Interest earnings / Rates of return

Plan Year	Superannuation Account	Canadian Forces Pension Fund	Reserve Force Pension Fund
2017	4.4%	12.8%	12.8%
2018	4.1%	9.8%	9.8%
2019	4.0%	7.1%	7.1%

C.7 Sources of Asset and Accounts Available for Benefits Data

The Superannuation Account, the RCA Account, the CFPF and the RFPF entries shown in Section C.1 above were taken from the Public Accounts of Canada and the financial statements of the Public Sector Pension Investment Board.

Appendix D — Membership Data

D.1 Sources of Membership Data

The valuation input data required in respect of Regular Force and Reserve Force members, former members (pensioners) and survivors extracted from master computer files maintained by Public Services and Procurement Canada (PSPC).

The valuation input data file on provided by PSPC covers the period of 1 April 2009 to 31 March 2019.

D.2 Validation of Membership Data

D.2.1 Status-Related Tests

The following status tests were performed on the main valuation data file:

- a consistency check that a status could be established for each record of a member. The status of a member may change over time but at a given point in time it can be only one of the following: contributor, outstanding termination, pensioner, deceased leaving an eligible survivor;
- a consistency check of the changes in status of a member during the intervaluation period; e.g.
  - if a contributor record indicated that the member retired, then a pensioner record should exist; and
  - if a contributor or pensioner record indicated that the member died leaving an eligible survivor, then a corresponding survivor record should exist;
- a reconciliation between the status of members as at 31 March 2019 from the current valuation data and the status of the members as at 31 March 2016 from the previous valuation data.

D.2.2 Benefit-Related Tests

Consistency tests were performed to ensure that all information required to value the member benefits based on individual statuses as at 31 March 2019 was included, by verifying that

D.2.2.1 For Regular Force Active Members

- the pensionable and qualifying service was reasonable in relation to the attained age;
- the salary was included and, if not, a salary was calculated by updating a salary rate from a previous year with an average earnings increase or, failing that, the average salary rate for that rank, sex, age and service was used.

D.2.2.2 For Reserve force Active Members

- the pensionable and qualifying service was reasonable in relation to the attained age;
- the earnings were included and, if not, imputing earnings by updating earnings from a previous year with an average earnings increase or failing that, using the average earnings for that sex.

D.2.2.3 For Pensioners and Survivors in Receipt of an Annuity

- the amount of the annuity, including indexation, was included; and

- the benefits were indexed up to 1 January 2019.

D.2.2.4 For Adjustments to Status and Benefit Data

- appropriate adjustments were made to the basic data, after consulting with the data providers, based on the omissions and discrepancies identified by the tests described herein and other additional tests.

D.3 Membership Data

A summary of the valuation data as at 31 March 2019 and detailed reconciliation of membership data since the last valuation are shown in the following tables. Detailed membership data are shown in Appendix K.

Table 32 Summary of Membership Data

	Regular Force Pension Plan		Reserve Force Pension Plan	
	31 March 2019	31 March 2016	31 March 2019	31 March 2016
Contributors				
Number	71,532	70,767	18,217	19,106
Average Pensionable Earnings	$74,054	$70,422	$18,595	$14,594
Average Age	35.6	36.0	34.5	33.9
Average Accrued Service[1]	11.6	12.3	7.6	7.3
Retirement Pensioners in Pay[2]				
Number	90,620	88,108	1,821	1,170
Average Annual Pension in Pay	$36,803	$33,978	$5,035	$5,736
Average Age	64.5	64.3	64.6	63.7
DeferredPensioners[2]				
Number	2,715	3,481	7,111	5,553
Average Annual Deferred Pension	$8,761	$7,777	$1,351	$1,491
Average Age	38.4	35.8	36.3	35.1
3A Disability Pensioners				
Number	494	648	-	-
Average Annual Pension in Pay	$18,934	$19,130	-	-
Average Age	71.6	70.2	-	-
Eligible Surving Spouses				
Number	21,720	22,443	112	54
Average Annual Pension in Pay	$14,905	$13,760	$1,988	$2,285
Average Age	79.4	78.9	57.5	52.6
Eligible Surving Children				
Number	575	682	50	28
Average Annual Pension in Pay	$2,671	$2,390	$376	$581

1 Average Pensionable Service for the Reserve Force Pension Plan
2 Includes Disability 3B

Table 33 Reconciliation of Regular Force Contributors

	Male			Female			
	Officer	Other Rank	Total	Officer	Other Rank	Total	Total
As at 31 March 2016	14,020	45,984	60,004	3,081	7,682	10,763	70,767
Data corrections	1,020	(955)	65	250	(203)	47	112
New Contributors							
New entrants	2,248	8,795	11,043	723	1,715	2,438	13,481
Rehired from cash-out	21	161	182	8	21	29	211
Rehired from pensioners Part I	44	116	160	10	11	21	181
Rehired from pensioners Part I.1	1	6	7	-	-	-	7
Subtotal	2,314	9,078	11,392	741	1,747	2,488	13,880
Changes of Officers/Other Ranks	167	(167)	-	50	(50)	-	-
Lump sum terminations							
Return of contribution	(168)	(1,067)	(1,235)	(50)	(136)	(186)	(1,421)
Transfer value	(462)	(2,940)	(3,402)	(115)	(367)	(482)	(3,884)
Rollover Termination							
Transfer to Res. Part I	(4)	(18)	(22)	(4)	(5)	(9)	(31)
Transfer to Reg. Force	224	1,319	1,543	75	271	346	1,889
Subtotal	(410)	(2,706)	(3,116)	(94)	(237)	(331)	(3,447)
Pensionable terminations							
Disability (3A)	-	(1)	(1)	-	-	-	(1)
Death	(32)	(99)	(131)	(4)	(8)	(12)	(143)
Disability (3B)	(623)	(3,460)	(4,083)	(205)	(841)	(1,046)	(5,129)
Retirement							
Immediate	(1,419)	(1,958)	(3,377)	(165)	(208)	(373)	(3,750)
Deferred	(123)	(527)	(650)	(35)	(72)	(107)	(757)
Subtotal	(2,197)	(6,045)	(8,242)	(409)	(1,129)	(1,538)	(9,780)
As at 31 March 2019	14,914	45,189	60,103	3,619	7,810	11,429	71,532

Table 34 Reconciliation of Reserve Force Contributors

	Male			Female			
	Officer	Other Rank	Total	Officer	Other Rank	Total	Total
As at 31 March 2016	4,354	10,554	14,908	2,228	1,970	4,198	19,106
Data corrections	92	(642)	(550)	(7)	(159)	(166)	(716)
New Participants	1,013	4,009	5,022	416	869	1,285	6,307
Rehired/pensioners Part I.1	103	129	232	80	23	103	335
Subtotal	1,116	4,138	5,254	496	892	1,388	6,642
Lumpsum terminations							
Return of contribution	(100)	(312)	(412)	(27)	(61)	(88)	(500)
Transfer value	(249)	(830)	(1,079)	(177)	(178)	(355)	(1,434)
Transfer to Res. Part I	4	19	23	2	5	7	30
Transfer to Reg. Force	(355)	(1,326)	(1,681)	(114)	(279)	(393)	(2,074)
Subtotal	(700)	(2,449)	(3,149)	(316)	(513)	(829)	(3,978)
Pensionable terminations							
Disability	(21)	(66)	(87)	(2)	(19)	(21)	(108)
Death	(20)	(20)	(40)	(6)	(2)	(8)	(48)
Retirement	(641)	(1,503)	(2,144)	(303)	(234)	(537)	(2,681)
Subtotal	(682)	(1,589)	(2,271)	(311)	(255)	(566)	(2,837)
As at 31 March 2019	4,180	10,012	14,192	2,090	1,935	4,025	18,217

Table 35 Reconciliation of Regular Force Pensioners

	Male			Female			
	Officer	Other Rank	Total	Officer	Other Rank	Total	Total
Retirement Pensioners							
As at 31 March 2016	16,792	50,480	67,272	1,195	3,549	4,744	72,016
Data corrections	170	(1,341)	(1,171)	(16)	(97)	(113)	(1,284)
New pensioners	1,542	2,485	4,027	200	280	480	4,507
Death	(1,271)	(4,319)	(5,590)	(42)	(57)	(99)	(5,689)
Rehired	(46)	(116)	(162)	(10)	(11)	(21)	(183)
As at 31 March 2019	17,187	47,189	64,376	1,327	3,664	4,991	69,367
Disability Pensioners (3A)							
As at 31 March 2016	68	502	570	15	63	78	648
Data corrections	(16)	(32)	(48)	-	(4)	(4)	(52)
New pensioners	-	1	1	-	-	-	1
Death	(7)	(91)	(98)	(2)	(3)	(5)	(103)
As at 31 March 2019	45	380	425	13	56	69	494
Disability Pensioners (3B)							
As at 31 March 2016	1,625	14,815	16,440	415	2,718	3,133	19,573
Data corrections	43	(101)	(58)	(6)	(50)	(56)	(114)
New pensioners	623	3,460	4,083	205	841	1,046	5,129
Death	(34)	(556)	(590)	(5)	(25)	(30)	(620)
Rehired	-	-	-	-	-	-	-
As at 31 March 2019	2,257	17,618	19,875	609	3,484	4,093	23,968

Table 36 Reconciliation of Reserve Force Pensioners

	Male			Female			
	Officer	Other Rank	Total	Officer	Other Rank	Total	Total
Retirement Pensioners							
As at 31 March 2016	1,672	3,649	5,321	626	746	1,372	6,693
Data corrections	(100)	(322)	(422)	(31)	(94)	(125)	(547)
New pensioners	641	1,503	2,144	303	234	537	2,681
Death	(27)	(7)	(34)	(5)	(3)	(8)	(42)
Rehired	(41)	(76)	(117)	(35)	(9)	(44)	(161)
As at 31 March 2019	2,145	4,747	6,892	858	874	1,732	8,624
Disability Pensioners							
As at 31 March 2016	17	8	25	-	5	5	30
Data corrections	30	92	122	5	46	51	173
New pensioners	21	66	87	2	19	21	108
Death	(1)	(1)	(2)	-	(1)	(1)	(3)
As at 31 March 2019	67	165	232	7	69	76	308

Table 37 Reconciliation of Spouse Survivors

	Regular Force Pension Plan			Reserve Force Pension Plan		
	Widows	Widowers	Total	Widows	Widowers	Total
31 March 2016	22,256	187	22,443	44	10	54
Data corrections	152	159	311	5	(2)	3
New from contributors	133	6	139	20	1	21
New from pensioners	3,236	48	3,284	29	5	34
Spouse deaths	(4,447)	(10)	(4,457)	-	-	-
31 March 2019	21,330	390	21,720	98	14	112

Table 38 Reconciliation of Survivors - Children/Students

	Regular Force Pension Plan			Reserve Force Pension Plan		
	Children	Students	Total	Children	Students	Total
31 March 2016	449	233	682	24	4	28
Data corrections	171	(62)	109	17	5	22
New from contributors	95	5	100	-	-	-
New from pensioners	73	23	96	-	-	-
Eligible as Student	(215)	215	-	-	-	-
Termination of Benefits	(131)	(281)	(412)	-	-	-
31 March 2019	442	133	575	41	9	50

Appendix E — CFSA Valuation Methodology

E.1 Plan Assets and Accounts

E.1.1 Canadian Forces Superannuation Account

The balance of the Superannuation Account forms part of the Public Accounts of Canada. The underlying notional bond portfolio described in Appendix C is shown at book value.

The only other Superannuation Account–related amount available for benefits consists of the discounted value of future Regular Force member contributions and government credits in respect of prior service elections. The discounted value of future member contributions was calculated using the projected Superannuation Account yields. The government is assumed to match these future member contributions when paid at a single rate, but no contributions are credited by the government if the member is paying the double rate.

E.1.2 Canadian Forces and Reserve Force Pension Funds

For valuation purposes, an adjusted market value method is used to determine the actuarial value of assets in respect of the CFPF and RFPF. The method is unchanged from the previous valuations.

Under the adjusted market value method, the difference between the observed investment returns during a given plan year and the expected investment returns for that year based on the previous report assumptions, is recognized over five years at the rate of 20% per year. The actuarial value of assets is then determined by applying a 10% corridor, such that the actuarial value of assets is within 10% of the market value of assets. As a result, the actuarial value of assets is a five-year smoothed market value where the investment gains or losses are recognized at the rate of 20% per year subject to a 10% corridor to the market value of assets. The value produced by this method is related to the market value of the assets but is more stable than the market value.

The other Pension Fund–related assets consist of:

- the discounted value of future member and government contributions in respect of prior service elections[1]. The discounted value of future member and government contributions was calculated using the assumed rates of return on the Pension Fund;
- the amount payable/receivable from Reserve Force Rollover members[2]; and
- the remaining contributions for processed and unprocessed Reserve Force prior service. This is the estimated amount of contributions for pre-2007 Reserve Force service that Regular Force members and Reserve Force members have committed to purchase.

The actuarial value of the assets determined as at 31 March 2019 under the adjusted market value method is $31,586 million and was determined as follows.

1 As defined in Appendix A.3.2.2
2 As defined in A.5.23

Table 39 Actuarial Value of Canadian Forces Pension Fund Assets
($ millions)

Plan Year	2015	2016	2017	2018	2019	
Actual net investment return (A)	2,699	159	2,995	2,665	2,188	
Expected investment return (B)	933	1,175	1,081	1,307	1,500	
Investment gains (losses) (A-B)	1,766	(1,016)	1,914	1,358	688	
Unrecognized percentage	0%	20%	40%	60%	80%	
Unrecognized investment gains (losses)	0	(203)	766	815	550	
Market value as at 31 March 2019						33,123
Less						
Total unrecognized investment gains (losses)						1,928
Actuarial value as at 31 March 2019 (before application of corridor)						31,195
Impact of the application of corridor [1]						-
Actuarial value as at 31 March 2019 (after application of corridor)						31,195
Plus						
Present value of prior service contributions						328
Amount receivable from Part I.1 - Rollover members						63
Remaining contributions for pre-2007 Reserve Force service						-
Actuarial value as at 31 March 2019						31,586

The actuarial value of the assets determined as at 31 March 2019 under the adjusted market value method is 538 million and was determined as follows.

Table 40 Actuarial Value of Reserve Force Pension Fund Assets
($ millions)

Plan Year	2015	2016	2017	2018	2019	
Actual net investment return (A)	68	4	71	61	49	
Expected investment return (B)	23	27	23	27	29	
Investment gains (losses) (A-B)	45	(23)	48	34	20	
Unrecognized percentage	0%	20%	40%	60%	80%	
Unrecognized investment gains (losses)	-	(5)	19	20	16	
Market value as at 31 March 2019						613
Less						
Total unrecognized investment gains (losses)						50
Actuarial value as at 31 March 2019 (before application of corridor)						563
Impact of the application of corridor [1]						-
Actuarial value as at 31 March 2019 (after application of corridor)						563
Less						
Amount payable to Regular Force Plan (Rollover members)						63
Plus						
Present value of prior service contributions						38
Actuarial value as at 31 March 2019						538

[1] The corridor is 90% - 110% of the market value, that is (29,811 - 36,435) for the CFPF and (552 - 674) for the RFPF.

E.2 Actuarial Cost Method

As benefits earned in respect of current service will not be payable for many years, the purpose of an actuarial cost method is to assign costs over the working lifetime of the members.

As in the previous valuation, the projected accrued benefit actuarial cost method (also known as the projected unit credit method) was used to determine the current service cost and actuarial liability. Consistent with this cost method, pensionable earnings are projected up to retirement using the assumed annual increases in average pensionable earnings (including seniority and promotional increases). The yearly maximum salary cap and other benefit limits under the *Income Tax Act* described in Appendix B were taken into account to determine the benefits payable under CFPF and RFPF and those payable under the RCA.

E.2.1 Current Service Cost

Under the projected accrued benefit actuarial cost method, the current service cost, also called the normal cost, computed in respect of a given year, is the sum of the value, discounted in accordance with the actuarial assumptions for the CFPF and RFPF, of all future payable benefits considered to accrue in respect of that year's service. The CFPF and RFPF administrative expenses[1] are deemed to be included in the total current service cost.

Under this method, the current service cost for an individual member will increase each year as the member approaches retirement. However, all other things being equal, the current service cost for the total population, expressed as a percentage of total pensionable payroll, can be expected to remain stable as long as the average age and service of the total population remains constant. For a given year, the government current service cost is the total current service cost reduced by the members' contributions during the year.

The Reserve Force Plan has been in operation since 1 March 2007. As at 31 March 2019 the average age and pensionable service are respectively 34.5 and 7.6 years. Being a young pension plan, the Reserve Force Plan current service cost is expected to increase over the years. In addition, the pension plan's own experience is limited and determining when the current service cost for the total population will become stable is still unknown at this time.

E.2.2 Actuarial Liability

The actuarial liability with respect to contributor corresponds to the value, discounted in accordance with the actuarial assumptions, of all future payable benefits accrued as at the valuation date in respect of all previous service to the credit of members. For pensioners and survivors, the actuarial liability corresponds to the value, discounted in accordance with the actuarial assumptions, of future payable benefits.

E.2.3 Actuarial Excess (Deficit)

It is unlikely that the actual experience will conform exactly to the assumptions that underlie the actuarial estimates. Thus, a balancing item must be calculated under this cost method to estimate the necessary adjustments. Adjustments may also be necessary if the terms of the pension benefits enacted

[1] As defined in G.2.3

by legislation are modified or if assumptions need to be updated.

The actuarial excess or deficit is the difference between the actuarial value of assets and the actuarial liability. The disposition of any actuarial surplus or deficit is defined in the CFSA.

E.2.4 Government Contributions

The recommended government contribution corresponds to the sum of:

- the government current service cost;
- the government contributions for prior service; and
- as applicable, special payments in respect of a deficit or, as the case may be, actuarial surplus debits.

E.2.5 Hypothetical Wind-Up Valuation

The payment of accrued pension benefits being the responsibility of the government, the likelihood of the plan being wound-up and its obligation not being fulfilled is practically nonexistent. Further, the legislation does not define the benefits payable upon wind-up. Therefore, a hypothetical wind-up valuation has not been performed.

E.3 Projected Yields and Rates of Return

The projected yields (shown in Appendix F) used to calculate future interest credits to the Superannuation Account are the projected annual yields on the combined book value of the Superannuation Accounts of the Public Service, Canadian Forces and RCMP pension plans.

The projected Superannuation Account yields were determined by an iterative process involving the following:

- the combined notional bond portfolio of the three Superannuation Accounts as at the valuation date;
- the assumed future new money interest rates (also shown in Appendix F);
- the expected future benefits payable in respect of all pension entitlements accrued up to 31 March 2000;
- the expected future contributions for prior service elections made up to 31 March 2000; and
- the expected future administrative expenses,

taking into account that the quarterly interest credited to the Superannuation Account is calculated as if the principal at the beginning of a quarter remains unchanged during the quarter.

The projected yields (shown in Appendix F) were then used for the computation of the present value of benefits to determine the liability for service prior to 1 April 2000.

The projected rates of return (shown in Appendix F) assumed for computing the present value of the benefits accrued or accruing under the CFPF and the RFPF were developed on the basis that the Funds hold a diversified mix of assets.

E.4 Membership Data

For valuation purposes, individual data on each member were used. The member data shown in Appendices D and K was provided as at 31 March 2019. This valuation is based on the member data as at the valuation date. The information in respect of the contributions for elected prior service was provided as at 31 March 2019. Future member contributions in respect of elected prior service took into account only the payment streams that were still in effect at 31 March 2019. Only payments due after 31 March 2019 were included.

Appendix F — CFSA Economic Assumptions

All of the assumptions used in this report are best-estimate assumptions, i.e. they reflect our best judgement of the future long-term experience of the plan and do not include margins.

F.1 Inflation-Related Assumptions

F.1.1 Level of Inflation

Price increases, as measured by changes in the Consumer Price Index (CPI), tend to fluctuate from year to year. In 2016, the Bank of Canada and the Government renewed their commitment to keep inflation between 1% and 3% until the end of 2021. In the Bank of Canada January 2020 Monetary Policy Report, it is stated that the long-term inflation expectations show an average of 2.0% through 2029; in the Bank of Canada April 2020 Monetary Policy Report, there is no indication of adjustments to the 2% inflation target. In our report, to reflect recent experience and market expectations, the level of inflation is assumed to be of 2.0% in plan year 2020, 1.0% in plan year 2021, and 2.0% for plan year 2022 and thereafter. The ultimate rate of 2.0% is unchanged from the assumed rate in the previous valuation.

F.1.2 Increase in Pension Indexing Factor

The assumption in respect to the year's pension indexing factor is required to account for indexation of pensions each January 1. It is derived by applying the indexation formula described in Appendix A, which relates to the assumed CPI increases over successive 12-month periods ending on September 30.

F.2 Employment Earnings Increases

F.2.1 Increase in the Year's Maximum Pensionable Earnings (YMPE)

Since the benefit payable under the plan when a pensioner attains age 65[1] is calculated based on the YMPE, an assumption for the increase in the YMPE is required in the valuation process. The assumed increase in the YMPE for a given calendar year is derived, in accordance with the Canada Pension Plan to correspond to the increase in the average weekly earnings (AWE), as calculated by Statistics Canada, over successive 12 month periods ending on 30 June. The AWE, and thus the YMPE, is deemed to include a component for seniority and promotional increases applicable to the general working population in Canada. The YMPE is equal to $58,700 for calendar year 2020. Future increases in the YMPE correspond to the assumed real[2] increases in the AWE plus assumed increases in the CPI.

The real-wage differential (real increase in the AWE) is developed taking into account historical trends, a possible labour shortage and an assumed moderate economic growth for Canada; it is assumed to be 0.5% for plan year 2021, and is expected to gradually increase to the ultimate assumption of 1.0% by plan year 2026 (1.1% in plan year 2024 in the previous valuation). The ultimate real-wage differential assumption combined with the ultimate price increase assumption results in an assumed annual increase in nominal wages of 3.0% in plan year 2026 and thereafter. Thus, the ultimate rate of increase

[1] Or becomes entitled to a disability pension from the CPP or the QPP.

[2] Note that all real rates presented in this report are actually differentials, i.e. the difference between the effective annual rate and the rate of increase in prices. This differs from the technical definition of a real rate of return, which, for example in the case of the ultimate Projected Return on the Fund assumption would be 3.9% (derived as 1.060/1.020) rather than 4.0%.

for the YMPE is 3.0%.

F.2.2 Increase in Pensionable Earnings

Average pensionable earnings are applicable to plan members only, whereas the YMPE applies to the general working population in Canada. In addition, increases in average pensionable earnings are exclusive of seniority and promotional increases, which are considered under a separate demographic assumption. Thus, the annual increase in average pensionable earnings is assumed to be 0.3% lower than the corresponding increase in the YMPE (same assumption as in the previous valuation) except for the first three years which were provided by the Department of National Defence. This corresponds to an ultimate increase in average pensionable earnings of 2.7% for plan year 2026 and thereafter (2.8% in the previous valuation for plan year 2024 and thereafter).

F.2.3 Increase in Tax Related Maximum Pensionable Earnings (MPE)

The maximum annual pension accrual of $3,025.56 for 2019 will increase to $3,092.22 for 2020, in accordance with the *Income Tax Regulations*. Thereafter, the maximum annual pension accrual is assumed to increase in accordance with the assumed annual increase in the YMPE, which is the same as the assumed annual increase in the AWE.

F.2.3.1 Regular Force Plan

The tax-related maximum pensionable earnings were derived from both the maximum annual pension accrual under a registered defined benefit plan as previously defined and the YMPE.

Beginning with calendar year 2012, the coordination factor is 0.625%. The MPE is $173,000 for calendar year 2020.

F.2.3.2 Reserve Force Plan

The tax-related maximum pensionable earnings were derived from the maximum annual pension accrual under a registered defined benefit plan.

The MPE is $206,100 for calendar year 2020. As at 31 March 2019, no member had earnings in excess of $206,100. Since no Registered Compensation Agreement has been setup for members of Part I.1, no contributions nor benefit accrual are accumulated for members earnings above the MPE.

F.3 Investment-Related Assumptions

F.3.1 New Money Rate

The new money rate is the nominal yield on 10-year-plus Government of Canada bonds and is set for each year in the projection period. The real yield on 10-year-plus federal bonds is equal to the new money rate less the assumed rate of inflation.

Recognizing recent experience, the annual real yield on 10-year-plus federal bonds is assumed to be - 0.4% in plan year 2020. It is further assumed to remain negative until plan year 2024 (except for plan year 2021) and then increase gradually to its ultimate level of 2.5% in plan year 2036. The assumed short-term (2020-2024) rates are consistent with the average of private sector forecasts and take into

account the recent market conditions. The ultimate real yield was assumed to be 2.7% in the previous valuation. The real new money rates over the plan years 2020 to 2029 are on average 1.8% lower than those assumed in the previous valuation for the same period.

F.3.2 Projected Yields on Superannuation Account

These yields are required for the computation of present values of benefits to determine the liability for service prior to 1 April 2000. The methodology used to determine the projected yields on the Superannuation Account is described in Appendix E. It is unchanged from previous valuations. Since the real projected yields are based on the real yields on 10-year-plus federal bonds, they are projected to be lower than assumed in the previous valuation (the ultimate projected yield is 0.2% lower than in the previous valuation, reaching 4.5% in plan year 2053).

F.3.3 Rate of Return on the CFPF & RFPF

The expected annual nominal rates of return on the Pension Fund are required for the computation of present values of benefits to determine the liability for service since 1 April 2000 and the current service cost. The following sections describe how the rates of return on the Pension Fund are determined.

F.3.3.1 Investment Strategy

Since 1 April 2000, government and employee contributions, net of benefit payments and administrative expenses, are invested in capital markets by the Public Sector Pension Investment Board (PSPIB). PSPIB aims to maximize returns without undue risk of loss according to the investment policy set and approved by its Board of Directors that takes into account the needs of contributors and beneficiaries, as well as financial market constraints. For the purpose of this report and in line with the PSPIB investment policy, the investments have been grouped into four broad categories: fixed income securities, equities, real assets and credit. Fixed income securities consist of a mix of federal, provincial and real return bonds. Equities consist of public (Canadian and foreign) and private equities. Real assets include real estate, infrastructure and natural resources. Credit is composed of private debt investments.

As at 31 March 2019, PSPIB's assets consisted of 21% fixed income securities (including 3% cash), 45% equity (including 1% complementary investments), 28% real assets and 6% credit. PSPIB has developed a long-term target Policy Portfolio (approved by its Board of Directors in the fall of 2018 and subject to an annual review), which consists of 20% fixed income securities, 43% equity, 30% real assets and 7% credit. The Policy Portfolio asset mix weights represent long-term targets. Therefore, it is assumed that the initial asset mix (derived using the actual investments reported by PSPIB as at 31 March 2019) will gradually converge towards the long-term target Policy Portfolio. The ultimate asset mix will be reached in plan year 2024 in the projection period.

Net cash flows (contributions less expenditures, disregarding special payments) are expected to become negative during plan year 2026 for CFPF and 2046 for RFPF, at which points a portion of investment income will be required to pay benefits.

Table 41 shows the assumed asset mix for each plan year throughout the projection period.

Table 41 Asset Mix
(in percentage)

Plan Year	Fixed Income Securities	Cash	Public Equity	Private Equity	Real Assets	Credit
2020	18	3	30	15	28	6
2021	18	3	30	14	28	7
2022	18	2	30	14	29	7
2023	18	2	30	13	30	7
2024	18	2	30	13	30	7
2025+	18	2	30	13	30	7

F.3.3.2 Real Rates of Return by Asset Type

Rates of return are determined for each asset class in which the Pension Fund assets are invested. With the exception of fixed income securities and cash, rates of return are assumed to remain constant for the entire projection period. The expected progression of fixed income securities' rates of return reflects the current context of low yields and the general outlook that yields will remain low for a few years and slowly increase thereafter. A constant rate of return is assumed for more volatile asset classes, reflecting the difficulty to predict annual market returns.

The rates of return were developed by looking at historical returns (expressed in Canadian dollars); these returns were then adjusted upward or downward to reflect future expectations. Given the long projection period, future gains and (losses) due to currency variations were expected to offset each other over time. Hence, it was assumed that currency variations will not have an impact on the long-term rates of return.

In the previous valuation, the assumed rates of return of each asset class included an allowance for diversification that is achieved through the rebalancing of the portfolio that keeps the asset mix constant over time. For this valuation, an overall diversification allowance is instead added to the rate of return on the total assets. Details are presented in subsection F.3.3.4.

All rates of return described in this section are shown before reduction for assumed investment expenses; subsection F.3.3.3 describes how the returns are adjusted for investment expenses.

Fixed Income Securities

As at 31 March 2019, PSPIB had 21% of its portfolio invested in fixed income securities, including Canadian fixed income, inflation-linked bonds (mostly US Treasury Inflation-Protected Securities (TIPS)) and cash. It is assumed that the proportion invested in fixed income securities will decrease to 20% of Pension Fund assets in plan year 2022 and remain at that level for the projection period.

Based on information provided by PSPIB, starting 1 April 2020 and fully effective by March 2021, the allocation to US TIPS will be reduced by 2% (from 9% to 7% of the total portfolio). This will be replaced by an increasing allocation to emerging market debt. Consequently, the fixed income securities' ultimate mix (excluding cash) in plan year 2022 and thereafter is expected to consist of 25% federal bonds, 25% provincial bonds, 39% US TIPS and 11% emerging market debt, which reflects PSPIB's long-term target allocation.

As described in subsection F.3.1 above, the assumed real yield on 10-year-plus federal bonds is expected to remain negative until plan year 2024 (except for plan year 2021) and then increase gradually to its ultimate level of 2.5% in plan year 2036. The assumed short-term (2020-2024) rates are consistent with the average of private sector forecasts and take into account the recent market conditions. The initial spread of 10-year-plus federal bonds over cash is assumed to be 10 basis points in plan year 2020 and progress to the ultimate spread 160 basis points by plan year 2036. The initial spread of long-term provincial bonds over cash is assumed to be 105 basis points while the ultimate spread is assumed to be 225 basis points (in plan year 2036). The initial spread of inflation-linked bonds over cash is assumed to be 75 basis points and is expected to increase to 150 basis points in plan year 2036. The initial spread of emerging market debt over cash is assumed to be 145 basis points and the ultimate spread is assumed to be 240 basis points in plan year 2036.

Since the current PSPIB policy portfolio and its long-term target Policy Portfolio is composed of universe bonds (long, mid and short terms), it is assumed that fixed income securities are composed of universe bonds for the entire projection period. Due to their overall shorter maturity, the yields on universe bonds are lower than the yields on long-term bonds. As a result, the spreads of universe bonds over cash are lower than those of long-term bonds over cash. The spread of the universe federal bonds over cash is assumed to increase from negative 5 basis points in plan year 2020 to 90 basis points in plan year 2036. The spread between universe provincial bonds and cash is assumed to increase from 75 basis points to 180 basis points between plan year 2020 and plan year 2036. Note that the recent flattening yield curves help to explain the low 2020 spread levels above.

The expected real rates of return for individual bonds take into account the coupons and market value fluctuations due to the expected movement of their respective yield rates. The real yield on 10-year-plus federal bonds is assumed to remain negative until plan year 2024 (except for plan year 2021), then gradually increase between plan years 2024 and 2036. Consequently, bond returns are quite low for the plan years prior to 2036. The assumed ultimate real rate of return for 10-year-plus federal bonds is 2.5% starting in plan year 2036. An ultimate fixed income real rate of return of 2.4% is assumed for 2036 and thereafter.

Cash

The real rate of return on cash is assumed to be low for the first few years, reflecting the current environment and short-term forecasts; then it is assumed to gradually progress towards the ultimate rate of 0.9% in plan year 2036.

Equity

Currently, approximately half of the assets of the Pension Fund are invested in equities (both public and private). In the derivation of the real rates of return for these equity investments, consideration was given to the long-term equity risk premiums. The rates of return also include dividends from the equities and market value fluctuations. No distinction is made between realized and unrealized capital gains and losses.

Consistent with the assumption that risk taking must be rewarded, equity returns are developed by adding an equity risk premium to the expected real rate of return on cash[1]. The historical equity risk premium over cash worldwide for the 120-year and 50-year periods ending in 2019 were 4.3% and 4.7% respectively[2]. It is assumed that historical equity premiums were higher due to several non-repeatable factors (mainly diversification and globalization). As a result, the long-term expected equity risk premium is assumed to be lower than what was realized in the past 120 years. However, for developed markets, given the low cash returns over the plan years of the projection period prior to 2036, the equity risk premium is assumed to originally be higher and to slowly decrease to its ultimate rate of 3.1%[3]. The equity risk premium for emerging market equities is expected to be 90 basis points higher than for develop market equities, reflecting the additional risk inherent with investment in emerging markets. As a result, the risk premium of public equities over cash returns is 3.3%.

The equity risk premium for private equities is expected to be 70 basis points higher than for public equities, reflecting the additional risk inherent with investments in the private markets. It is generally accepted that the industry of private equities is maturing such that the convergence starts to be seen between on the returns on private equities and public equities. Such convergence is taken into account when determining the risk premium for private equities.

As stated in the previous section, the real rate of return on cash is set at 0.9% for plan years 2036 and thereafter. The real rates of return for public and private equities are thus projected at 4.2% and 4.9% respectively.

Real Assets

Real assets such as real estate, infrastructure and natural resources are considered to be a hybrid of fixed income and equity. For the purpose of this report, they are assumed to share characteristics of both of these asset classes in the proportion of 25% fixed income and 75% public equity. The proportion differs from that in the previous valuation to reflect information shared by PSPIB. Hence, the assumed return on real assets is composed of 25% of the return on fixed income securities and 75% of the return on public equity. Considering the inherent difficulties in modelling short-term returns for volatile assets, real assets are projected to earn 3.7% throughout the projection period.

Credit

Credit is also considered to be a hybrid of fixed income and equity. Therefore, based on information shared by PSPIB, it is assumed that credit shares characteristics of both of these asset classes in the proportion of 35% fixed income and 65% public equity. The proportion differs from that in the previous valuation. Hence, the assumed return on credit is composed of 35% of the return on fixed income securities and 65% of the return on public equity. Considering the inherent difficulties in modelling short-term returns for volatile assets, credit is projected to earn 3.6% throughout the projection period.

Table 42 summarizes the assumed real rates of return by asset type throughout the projection period, before the allowance for rebalancing and diversification and prior to reduction for investment expenses.

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1 In the previous valuation, the equity risk premium was expressed relative to long-term federal bonds.

2 Source: Elroy Dimson, Paul Marsh and Mike Staunton, Credit Suisse Global Investment Returns Yearbook 2020.

3 In the previous valuation, the equity risk premium showed (2.1%) was relative to federal 10-year-plus bonds and included an allowance for rebalancing and diversification.

Table 42 Real Rate of Return by Asset Type [1]
(in percentage)

Plan Year	Fixed Income Securities	Cash	Public Equity	Private Equity	Real Assets	Credit
2020	2.5	(0.5)	4.2	4.9	3.7	3.6
2021	(1.7)	(0.3)	4.2	4.9	3.7	3.6
2022	(1.3)	(1.1)	4.2	4.9	3.7	3.6
2023	(1.5)	(0.9)	4.2	4.9	3.7	3.6
2024	(1.9)	(0.8)	4.2	4.9	3.7	3.6
2025	(1.6)	(0.5)	4.2	4.9	3.7	3.6
2026	(0.3)	(0.3)	4.2	4.9	3.7	3.6
2027	(0.1)	(0.2)	4.2	4.9	3.7	3.6
2028	0.0	0.0	4.2	4.9	3.7	3.6
2029	0.2	0.1	4.2	4.9	3.7	3.6
2030	0.4	0.2	4.2	4.9	3.7	3.6
2031	0.5	0.4	4.2	4.9	3.7	3.6
2032	0.7	0.5	4.2	4.9	3.7	3.6
2033	1.1	0.6	4.2	4.9	3.7	3.6
2034	1.3	0.7	4.2	4.9	3.7	3.6
2035	1.7	0.8	4.2	4.9	3.7	3.6
2036+	2.4	0.9	4.2	4.9	3.7	3.6

F.3.3.3 Investment Expenses

Over the last three plan years, PSPIB's operating and asset management expenses averaged 0.7% of average net assets. It is assumed that going forward, PSPIB investment expenses will average 0.7% of average net assets. The majority of those investment expenses were incurred through active management decisions.

The active management objective is to generate returns in excess of those from the policy portfolio, after reduction for additional expenses. Thus, the additional returns from a successful active management program should equal at least the cost incurred to pursue active management. In nine of the past ten years, PSPIB's additional returns from active management exceeded related expenses. For the purpose of this valuation, it is assumed that additional returns due to active management will equal additional expenses related to active management. These expenses are assumed to be the difference between total investment expenses of 0.7% and the assumed expenses of 0.2% that would be incurred for passive management of the portfolio.

The next section shows the overall rate of return on the fund net of investment expenses.

F.3.3.4 Overall Rate of Return on Assets of the CFPF and the RFPF

The best-estimate rate of return on total assets is derived from the weighted average assumed rate of return on all types of assets using the assumed asset mix proportions as weights. The best-estimate rate of return is further increased to reflect additional returns due to active management and reduced to

[1] Before allowance for rebalancing and diversification.

reflect all investment expenses. The ultimate nominal and real rates of return are developed in Table 43.

Table 43 Overall Rate of Return on Assets of the CFPF and RFPF

	Nominal	Real
Weighted average rate of return	5.70%	3.70%
Additional returns due to active management	0.50%	0.50%
Allowance for rebalancing and diversification[1]	0.50%	0.50%
Expected investment expenses		
Expenses due to passive management	(0.20%)	(0.20%)
Additional expenses due to active management	(0.50%)	(0.50%)
Total expected investment expenses	(0.70%)	(0.70%)
Net rate of return	6.00%	4.00%

The resulting nominal and real rates of return for each projection year are as follows:

Table 44 Rates of Return on Assets in Respect of the CFPF and the RFPF[2]
(in percentage)

Plan Year	Nominal	Real
2020	5.9	3.9
2021	4.2	3.2
2022	5.3	3.3
2023	5.2	3.2
2024	5.2	3.2
2025	5.2	3.2
2026	5.4	3.4
2027	5.5	3.5
2028	5.5	3.5
2029	5.5	3.5
2030	5.6	3.6
2031	5.6	3.6
2032	5.6	3.6
2033	5.7	3.7
2034	5.8	3.8
2035	5.8	3.8
2036+	6.0	4.0
2020-2024	5.2	3.4
2020-2029	5.3	3.4
2030-2036	5.5	3.6

1 0.45% before rounding.
2 Do not reflect actual returns for plan year 2020.

It is assumed that the ultimate real rate of return on investments will be 4.0% in 2036, net of all investment expenses. This is the same as in the previous valuation. The real rates of return over the first ten years of the projection are on average 0.3% lower than assumed for the corresponding years in the previous valuation. The real rate of return on assets takes into account the assumed asset mix as well as the assumed real rate of return for all categories of assets. The nominal returns projected for the Pension Fund are simply the sum of the assumed level of inflation and the real return.

Using the variable real rates on return on assets in the previous table is equivalent to using a flat real discount rate of 3.6% for the purpose of calculating the liability at 31 March 2019 for service since 1 April 2000.

F.3.4 Transfer Value Real Interest Rate

Interest rates for transfer values are determined in accordance with the Standards of Practice published by the Canadian Institute of Actuaries (CIA). The CIA has issued amendments to the standards for determining the interest rates used for the computation of commuted value which will be effective 1 December 2020. At the time this valuation was conducted, there was little information publicly available to derive the interest rates for transfer values under the new standards. Therefore, the current standards were followed when preparing this report. In particular, the real interest rates to be used for the computation of commuted values as at a particular date are as follows. The new standards will be reflected in the next actuarial valuation.

First 10 years: $r_7 + 0.90\%$

After 10 years: $r_L + 0.5 \times (r_L - r_7) + 0.90\%$

Where $r_7 = r_L \times \left(\frac{i_7}{i_L}\right)$ and

r_L is the long-term real-return Government of Canada bond yield, annualized

i_L is the long-term Government of Canada benchmark bond yield, annualized and

i_7 is the 7-year Government of Canada benchmark bond yield, annualized

The obtained rates of interest are rounded to the next multiple of 0.10%.

For example, for plan year 2021, the assumed real rates of interest are 1.9% for the first 10 years and 2.1% thereafter. The rates are derived from the assumed CPI increase, the assumed 10-year-plus Government of Canada benchmark bond yield which corresponds to the new money rate in this valuation, and the assumed spreads[1] between the new money rate and the long-term real-return Government of Canada bond yield, the long-term Government of Canada benchmark bond yield, and the 7-year Government of Canada benchmark bond yield. Table 45 shows the assumed transfer value real interest rates used in this report:

[1] The spreads for the first year are based on the average spreads for plan year 2020 of 76, 4 and -19 basis points between 10-year-plus Government of Canada bond yield and the bonds underlying r_L, i_L and i_7 respectively. The ultimate spreads of -25, 9 and -69 basis points (starting in plan year 2036) are based on the average spreads over the last 10 years. An interpolation reflecting the variation in new money rates is applied for intermediate years.

Table 45 Transfer Value
(As a percentage)

Plan Year	r_L	i_L	i_7	r_7	Real Interest Rates	
					First 10 Years	After 10 Years
2020	0.35	1.64	1.41	0.30	1.20	1.30
2021	1.16	1.33	1.16	1.01	1.90	2.10
2022	0.35	1.64	1.41	0.30	1.20	1.30
2023	0.42	1.74	1.49	0.36	1.30	1.40
2024	0.61	2.05	1.74	0.52	1.40	1.60
2025	0.87	2.45	2.07	0.73	1.60	1.80
2026	1.06	2.76	2.32	0.89	1.80	2.10
2027	1.19	2.96	2.47	1.00	1.90	2.20
2028	1.32	3.17	2.64	1.10	2.00	2.30
2029	1.45	3.37	2.81	1.21	2.10	2.50
2030	1.58	3.57	2.97	1.31	2.20	2.60
2031	1.70	3.78	3.14	1.41	2.30	2.70
2032	1.83	3.98	3.30	1.52	2.40	2.90
2033	1.96	4.18	3.47	1.62	2.50	3.00
2034	2.09	4.39	3.63	1.72	2.60	3.20
2035	2.15	4.49	3.72	1.78	2.70	3.20
2036+	2.22	4.59	3.80	1.83	2.70	3.30

F.3.5 Summary of Economic Assumptions

The economic assumptions used in this report are summarized in the following table.

Table 46 Economic Assumptions[1]
(As a percentage)

	Inflation		Employment Earning Increases				Interest	
Plan Year	CPI Increase [2]	Pension Indexing [3]	YMPE [3]	Pensionable Earnings [4]	Maximum Pensionable Earnings [3,5]	New Money Rate	Projected Yield on Account	Projected Return on Funds
2020	**2.0**	**2.0**	**2.3**	1.9	**2.2**	1.6	3.7	5.9
2021	1.0	1.3	1.5	2.0	1.5	1.3	3.5	4.2
2022	2.0	1.8	2.6	1.9	2.6	1.6	3.3	5.3
2023	2.0	2.0	2.7	2.4	2.7	1.7	3.2	5.2
2024	2.0	2.0	2.8	2.5	2.8	2.0	3.1	5.2
2025	2.0	2.0	2.9	2.6	2.9	2.4	3.0	5.2
2026	2.0	2.0	3.0	2.7	3.0	2.7	2.9	5.4
2027	2.0	2.0	3.0	2.7	3.0	2.9	2.8	5.5
2028	2.0	2.0	3.0	2.7	3.0	3.1	2.7	5.5
2029	2.0	2.0	3.0	2.7	3.0	3.3	2.6	5.5
2030	2.0	2.0	3.0	2.7	3.0	3.5	2.6	5.6
2031	2.0	2.0	3.0	2.7	3.0	3.7	2.5	5.6
2032	2.0	2.0	3.0	2.7	3.0	3.9	2.4	5.6
2033	2.0	2.0	3.0	2.7	3.0	4.1	2.5	5.7
2034	2.0	2.0	3.0	2.7	3.0	4.3	2.5	5.8
2035	2.0	2.0	3.0	2.7	3.0	4.4	2.5	5.8
2036	2.0	2.0	3.0	2.7	3.0	4.5	2.5	6.0
2040	2.0	2.0	3.0	2.7	3.0	4.5	3.0	6.0
2045	2.0	2.0	3.0	2.7	3.0	4.5	3.9	6.0
2050	2.0	2.0	3.0	2.7	3.0	4.5	4.1	6.0
2053+	2.0	2.0	3.0	2.7	3.0	4.5	4.5	6.0

1 Bold figures denote actual experience.
2 Assumed to be effective during the Plan Year.
3 Assumed to be effective as at 1 January.
4 Assumed to be effective as at 1 April. Exclusive of seniority and promotional increases.
5 Calendar year 2020 Maximum Pensionable Earnings is $173,000 for the Regular Force Plan and $206,100 for the Reserve Force Plan.

As a reference, for periods ending December 2018, the following table was prepared based on the Canadian Institute of Actuaries Report on Canadian Economic Statistics 1924-2018.

Table 47 Report on Canadian Economic Statistics 1924-2018

Period of Years Ending 2018	15	25	50
Level of Inflation	1.7%	1.8%	4.0%
Real Increases in Pensionable Earnings	0.7%	0.4%	0.7%
Real Yield of Long-Term Canada Bonds	1.5%	2.7%	3.1%
Real Return on Long-Term Canada Bonds	4.0%	5.0%	4.2%
Average Real Return on Diversified Portfolios	4.8%	5.6%	4.6%

Appendix G — CFSA Demographic and Other Assumptions

G.1 Demographic Assumptions

Given the size of the Regular Force Plan population subject to the CFSA, the plan's own experience, except where otherwise noted, was deemed to be the best model to determine the demographic assumptions. Demographic assumptions based on service were derived from the pension plan experience of the last five years and those assumptions from the previous valuation not based on 'service' were updated to reflect past experience to the extent it was deemed credible.

The Reserve Force Plan is a young plan, with little experience, providing little predictable information for establishing appropriate demographic assumptions. Except where otherwise noted, the experience of the Regular Force members covered under Part I of the CFSA was deemed to be the best source of data to determine the demographic assumptions.

G.1.1 Seniority and Promotional Salary Increases

Seniority means length of service within a classification and *promotion* means moving to a higher rank.

The assumption for seniority and promotional salary increase for both the Regular Force Plan and Reserve Force Plan are determined by studying the experience for the Regular Force Plan.

The seniority and promotional salary increase assumption was slightly increased for the first five completed years of qualifying service, for both Officer and Other Rank members, to reflect the intervaluation experience. The seniority and promotion salary increase rates for higher numbers of years of qualifying service were marginally revised to reflect the intervaluation experience. The following table provide sample rates of seniority and promotional increases for both pension plans.

Table 48 Sample of Assumed Seniority and Promotional Salary Increases
(Percentage of annual earnings)

Completed Years of Qualifying Service [1]	Officer	Other Rank	Completed Years of Qualifying Service	Officer	Other Rank
0	7.9	20.3	10	3.8	0.8
1	8.2	17.9	11	3.7	0.9
2	15.9	5.4	12	3.4	1.0
3	25.8	9.4	13	3.0	1.1
4	11.6	2.6	14	2.7	1.2
5	7.1	2.1	15	2.4	1.2
6	7.5	1.8	20	2.0	1.2
7	5.2	1.5	25	1.7	1.2
8	4.3	1.0	30	1.3	0.9
9	4.0	0.8	40	0.5	0.5

[1] For the Reserve Force pension plan, completed years of pensionable service.

G.1.2 New Contributor

It is assumed that the distribution of new members by age and sex will be the same as that of members with less than one year of service at the valuation date, and that the number of new contributors will be such that the total number of contributors remains constant over the projection period.

The initial salary of new Regular Force Plan members or the initial earnings of new Reserve Force Plan members of a given age and sex in plan year 2020 is assumed to be the same as the corresponding experience in plan year 2019 with an economic salary increase for plan year 2020. Initial salary for Regular Force Plan members or the initial earnings for Reserve Force Plan members are assumed to increase in future years in accordance with the assumption for average earnings increases.

G.1.3 Any Occupation Disability Retirement (3A)

Disability retirement 3A under the Regular Force Plan and the disability retirement under the Reserve Force Plan are applicable to Canadian Forces member retiring with a disability pension due to the inability to perform any occupations.

In the previous valuation, the same assumption was used for both the Regular Force and the Reserve Force Plans. However, in the intervaluation period, only 15 members of the Regular Force Plan retired with a 3A disability and the occurrence of 3A any occupation disability observed since 2011 has remained extremely low. Consequently, it is assumed that no further 3A any occupation disability retirement will occur for members of the Regular Force Plan.

Under the Reserve Force Plan, the disability retirement assumption encompassed both 3A and 3B as long as the disabled member meets the disability requirement of the Canada Pension Plan. The assumption was revised to reflect the intervaluation experience and the experience showed more male disability retirements than expected while the exposure for female disability retirements were too low to justify any disability retirement rates adjustment.

Table 49 Sample of Assumed Rates of Disability Retirement - Reserve Force Plan
(Per 1,000 individuals)

Age Last Birthday	Male	Female
20	0.04	0.13
25	0.04	0.21
30	0.08	0.31
35	0.16	0.44
40	0.33	0.64
45	0.61	0.95
50	1.14	1.32
55	1.64	1.68
59	2.15	2.41

G.1.4 Own Occupation Disability (3B) Retirement – Regular Force Plan

In the previous valuation, the review of the intervaluation experience (plan years 2014 to 2016) had

showed a large increase in the number of 3B disabilities. Based on the information available at that time, it was unclear if the increase was an abnormality or a new steady state going forward due to the strict application of the principle of "Universality of Service[1]". Given the uncertainty, the 3B disability incidence rates were modified to incorporate a 10-year select period which recognized the expected increase for the near future while reverting to the average observed between plan years 2012 to 2014 after 10 years.

The current intervaluation experience has been consistent with the increased 3B disability incidence rates observed between plan years 2014 to 2016. Based on this analysis, 3B disability incidence rates are expected to remain at these higher rates. As such, the assumption for 3B disability incidence rates has been modified to reflect the recent experience and the 10-year select period applied in the previous valuation was removed. The following table provides a sample of 3B disability incidence rates for the Regular Force Plan.

Table 50 Sample of Assumed 3B Disability Incidence Rates (Own Occupation) - Regular Force Plan
(Per 1,000 individuals)

Completed Years of Qualifying Service	Male Officer	Male Other Rank	Female
1	0.7	2.6	7.6
5	4.0	9.8	11.7
10	8.2	31.5	34.7
15	10.0	34.8	45.3
20	18.1	60.5	63.6
25	22.0	67.3	87.7
30	33.9	82.9	124.4
35	78.0	137.0	158.5

There are no 3B disability incidence rates (own occupation) for the Reserve Force Plan as there are no such similar benefits provided under the Reserve Force Plan.

G.1.5 Pensionable Retirement

Members of the Canadian Forces may qualify for retirement using either their total qualifying Canadian Forces service or the pensionable service to their credit. For the Regular Force Plan, the assumed rates of pensionable retirement were revised to reflect the intervaluation experience (2017-2019). In general, the number of retirements increased compared to the 2014-2016 observation period of the previous report.

In the previous valuation, the pensionable retirement assumption rates were adjusted downward to account for the expected projected increase of 3B disability incidence rates over the next 10 years. However, as explained in section G.1.4 above, the increased level of disability 3B remained consistent with the level observed in the 2014-2016 period. In addition, the pensionable retirement experience over the intervaluation experience went against our downward expectation and almost kept pace with the experience observed during the 2014-2016 period. The intervaluation experience as shown that

[1] The requirement to be physically fit, employable and deployable for general operational duties.

there is no inverse correlation between pensionable retirement and disability 3B retirement. Consequently, the pensionable retirement rates were adjusted to reflect the intervalution experience.

The following tables provide sample rates of pensionable retirement for member of the Regular Force Plan.

Table 51 Sample of Assumed Rates of Retirement - Regular Force Plan - Old Terms of Service
(Per 1,000 individuals)

Completed Years of Qualifying Service	Officer		Other Rank	
	Male	Female	Male	Female
19	69	53	50	28
20	71	59	49	28
21	59	62	49	40
22	62	69	41	43
23	57	70	43	59
24	90	88	67	62
25	90	93	78	72
30	101	114	100	88
35	330	145	255	278
40	330	145	270	278

Table 52 Sample of Assumed Rates of Retirement - Regular Force Plan - New Terms of Service
(Per 1,000 individuals)

Completed Years of Qualifying Service	Officer		Other Rank	
	Male	Female	Male	Female
24	97	71	62	60
25	90	91	79	76
26	88	108	71	61
27	85	79	72	73
28	78	96	79	82
29	97	106	100	92
30	100	116	101	81
31	116	117	84	86
35	347	229	262	493
40	347	229	383	493

After a review of the Reserve Force Plan intervaluation experience, the retirement rates for less than 16 years of pensionable service were modified. Retirement rates after 15 years of pensionable service are the same as those in the previous report. Table 53 provides sample rates of pensionable retirement for the Reserve Force Plan.

Table 53 Sample of Assumed Rates of Retirement - Reserve Force members
(Per 1,000 individuals)

Completed Years of Pensionable Service	Age - Male			Age - Female		
	49	54	59	54	54	59
5	39	65	224	47	39	144
10	33	49	223	35	30	164
15	12	22	181	15	27	198
25	7	13	245	13	28	322
30	15	232	307	19	281	342
35	35	577	417	35	530	307

G.1.6 Withdrawal

Withdrawal means ceasing to be a member of the Regular Force Plan or the Reserve Force Plan for reasons other than death or retirement with an immediate annuity or an annual allowance.

Under the Regular Force Plan, the withdrawal assumptions were revised to reflect the intervaluation experience. For the Regular Force members and full time Reserve Force members valued under the Regular Force Plan, the withdrawal assumption rates are based on the qualifying service.

The experience shown a decrease of the number of withdrawal for members with less than 6 years of qualifying service and an general increase for members with more than 5 years of service. The withdrawal assumption rates have been adjusted to reflect the intervaluation experience.

In the past valuation, the withdrawal assumption rates were adjusted to account for the expected projected increase of 3B disability incidence rates over the next 10 years. As expected, the withdrawal experience over the intervaluation experience reflected an increased level of disability 3B. With these increased levels of disability 3B expected to remain past the initial 10 years (see section G.1.4 above), the withdrawal rates were adjusted to reflect the intervaluation experience and the expectation that this experience will continue.

Table 54 Sample of Assumed Withdrawal Rates - Regular Force Plan - Old Terms of Service
(Per 1,000 individuals)

Completed Years of Qualifying Service	Officer		Other Rank	
	Male	Female	Male	Female
0	66	60	106	71
1	28	25	27	17
5	14	19	42	22
10	25	14	21	19
15	13	10	12	11
18	14	12	15	16

Table 55 Sample of Assumed Withdrawal Rates - Regular Force Plan - New Terms of Service
(Per 1,000 individuals)

Completed Years of Qualifying Service	Officer		Other Rank	
	Male	Female	Male	Female
0	68	64	106	74
1	27	22	26	14
5	14	19	43	21
10	25	13	21	20
15	12	9	13	11
20	11	28	26	18
23	41	46	35	51

Part time Reserve Force members under the Regular Force Plan are being valued on the basis of their accrued pensionable service under the Canadian Forces similar to what is done for members of the Reserve Force Plan. The main distinction between the two assumptions is that the withdrawal assumptions for members of the Reserve Force Plan include both the decrements due to roll-over to the Regular Force Plan and those due to actual withdrawals.

For the Reserve Force Plan, the withdrawal assumption are determined based on the Plan own experience. The withdrawal assumption has been modified to take into account the experience of the last 3 years. Rates were mainly changed for service below 13 years, reflecting the period from the inception of the Reserve Force Plan in 2007.

The following four tables provide sample rates of withdrawal for Reserve Force members under both the Regular Force and Reserve Force Plans.

Table 56 Sample of Assumed Withdrawal Rates for Reserve Force Members - Male Officer
(Per 1,000 individuals)

Age Last Birthday	Completed Years of Pensionable Service											
	Reserve Force Plan						Regular Force Plan					
	0	1	5	10	15	20+	0	1	5	10	15	20+
20	70	93	53	-	-	-	70	93	53	-	-	-
25	84	93	71	77	-	-	84	93	71	77	-	-
30	93	83	88	67	19	-	93	83	88	67	19	-
35	88	57	87	56	18	9	88	57	87	56	18	9
40	71	35	73	44	17	9	71	35	73	44	17	9
45	51	23	56	31	15	9	51	23	56	31	15	9
50	35	13	11	12	15	15	35	13	11	12	15	15
55	28	13	11	12	15	15	28	13	11	12	15	15

Table 57 Sample of Assumed Withdrawal Rates for Reserve Force Members - Male Other Rank
(Per 1,000 individuals)

Age Last Birthday	Completed Years of Pensionable Service											
	Reserve Force Plan						Regular Force Plan					
	0	1	5	10	15	20+	0	1	5	10	15	20+
20	103	136	146	-	-	-	103	136	146	-	-	-
25	95	125	136	115	-	-	95	125	136	115	-	-
30	88	108	123	106	25	-	88	108	123	106	25	-
35	82	92	97	84	22	9	82	92	97	84	22	9
40	68	76	71	64	19	9	68	76	71	64	19	9
45	50	64	50	48	17	9	50	64	50	48	17	9
50	36	13	11	12	15	15	36	13	11	12	15	15
55	29	13	11	12	15	15	29	13	11	12	15	15

Table 58 Sample of Assumed Withdrawal Rates for Reserve Force Members - Female Officer
(Per 1,000 individuals)

Age Last Birthday	Completed Years of Pensionable Service											
	Reserve Force Plan						Regular Force Plan					
	0	1	5	10	15	20+	0	1	5	10	15	20+
20	35	64	84	-	-	-	35	64	84	-	-	-
25	46	63	84	102	-	-	46	63	84	102	-	-
30	57	61	81	81	21	-	57	61	81	81	21	-
35	60	58	78	61	21	10	60	58	78	61	21	10
40	56	57	77	45	22	10	56	57	77	45	22	10
45	39	57	76	34	24	10	39	57	76	34	24	10
50	24	13	11	12	15	15	24	13	11	12	15	15
55	15	13	11	12	15	15	15	13	11	12	15	15

Table 59 Sample of Assumed Withdrawal Rates for Reserve Force Members - Female Other Rank
(Per 1,000 individuals)

Age Last Birthday	Completed Years of Pensionable Service											
	Reserve Force Plan						Regular Force Plan					
	0	1	5	10	15	20+	0	1	5	10	15	20+
20	82	106	131	-	-	-	82	106	131	-	-	-
25	95	107	132	107	-	-	95	107	132	107	-	-
30	102	106	135	107	27	-	102	106	135	107	27	-
35	94	102	134	107	27	9	94	102	134	107	27	9
40	77	99	134	107	27	9	77	99	134	107	27	9
45	53	98	133	107	27	9	53	98	133	107	27	9
50	32	13	11	12	15	15	32	13	11	12	15	15
55	32	13	11	12	15	15	32	13	11	12	15	15

G.1.7 Proportion of Members Opting for a Deferred Annuity

Not all vested members transfer the commuted value of their deferred pension upon withdrawal, and an assumption must be made as to the proportion of members opting for a deferred annuity. For members of the Regular Force Plan, this assumption was revised to reflect the intervaluation experience. The proportion were reduced by an average of 30% for members under the old terms of service, and by an average of 38% for members under the new terms of service.

For Reserve Force members who are valued under the Regular Force Plan (Reservist under Part I), we have used the proportions of members opting for a deferred annuity under the Reserve Force Plan, modified to exclude members that are terminating and are rolling over to the Regular Force Plan. The resulting proportions were further analysed by completed years of qualifying service instead of age last birthday as done for the Reserve Force Plan. The following table shows a sample of the assumed proportions of members electing a deferred annuity upon withdrawal.

Table 60 Sample of Assumed Proportions of Members Electing a Deferred Annuity
(Per 1,000 individuals)

Completed Years of Qualifying Service	Old Terms of Service	New Terms of Service	Reservist under the PartI	Age Last Birthday	Reserve force - Part I.1
1	137	137	428	15	215
5	111	111	612	20	265
10	172	172	532	25	361
15	169	169	550	30	350
18	241	241	527	35	380
19	-	264	508	40	398
20	-	251	486	45	397
21	-	222	470	48	403
23	-	195	453		
24+	-	-	450		

G.1.8 Mortality

Mortality rate assumptions for contributors, retired pensioners, disabled pensioners, surviving spouses and longevity improvement factors are the same for both the Regular Force Plan and the Reserve Force Plan.

The mortality rate assumptions were revised based on the intervaluation experience.

For contributors and retirement pensioners aged 30 to 75, the assumed male mortality rates decreased by an average of 14% for officers and no impact for the other ranks. From ages above 75, the assumed male mortality rates increased by an average of 8% for officers and increased by average of 9% for the male other ranks. For 3B (own occupation) disability pensioners, the mortality rates assumption is the same as that for contributors and retirement pensioners. For female surviving spouses aged 30 to 90, the assumed mortality rates increased by an average of 4%.

The remaining assumptions, shown in Table 61, were not modified and were set equal to the 2017 base mortality projected to plan year 2020 using the longevity improvement factors of the previous actuarial

report. The following table provides sample rates of mortality.

Table 61 Sample of Assumed Rates of Mortality
Plan Year 2020
(Per 1,000 individuals)

Age Last Birthday	Contributors and Retirement Pensioners			Disability (3A) Pensioners			Surviving Spouses	
	Male			Male				
	Officer	Other Rank	Female	Officer	Other Rank	Female	Male	Female
30	0.4	0.6	0.3	0.5	2.9	0.4	0.8	0.2
40	0.5	0.8	0.4	0.9	3.9	0.9	1.3	1.6
50	0.7	2.2	1.2	6.0	6.9	2.5	3.0	3.2
60	2.2	6.1	3.4	13.2	12.9	6.1	8.0	7.1
70	8.7	18.2	10.5	24.1	27.2	15.2	20.4	16.9
80	41.4	51.8	31.7	56.1	62.2	41.0	53.5	42.1
90	146.3	168.8	101.2	128.6	156.6	115.8	147.4	116.0
100	330.9	366.5	276.5	298.9	323.6	274.5	325.4	307.2
110	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0

Mortality rates are reduced in the future in accordance with the same longevity improvement assumption[1] used in the 30th Actuarial Report on the Canada Pension Plan. Mortality improvements are expected to continue in the future but at a slower pace than most recently observed over the 15-year period ending in 2015. Further, it is assumed that, ultimately, mortality improvement rates for males will decrease to the same level as females.

Factors shown in the 30th Actuarial Report of the Canada Pension Plan are based on calendar years. These factors have been interpolated to obtain plan year longevity improvement factors.

A sample of assumed longevity improvement factors is shown in following table.

Table 62 Sample of Assumed Longevity Improvement Factors
(applicable at the end of the plan year)

Age Last Birthday	Initial and Ultimate Plan Year Mortality Reductions (%)			
	Male		Female	
	2021	2037+	2021	2037+
30	1.14	0.80	0.65	0.80
40	1.55	0.80	1.40	0.80
50	1.52	0.80	1.01	0.80
60	2.22	0.80	1.69	0.80
70	2.07	0.80	1.48	0.80
80	2.08	0.80	1.52	0.80
90	1.78	0.62	1.62	0.62
100	0.59	0.28	0.63	0.28
110	0.00	0.00	0.00	0.00

[1] In this report 'longevity improvement assumption' is equivalent to the 'mortality improvement assumption' discussed in the 30th Actuarial Report on the Canada Pension Plan.

The following table shows the calculated life expectancy for contributors and healthy pensioners based on the mortality assumptions described in this section.

Table 63 Life Expectancy of Contributors and Healthy Pensioners
(Years)

	As at 31 March 2019			As at 31 March 2036		
	Male			Male		
Age Nearest	Officer	Other Rank	Female	Officer	Other Rank	Female
60	28.5	25.7	29.4	29.4	26.8	30.3
65	23.6	21.2	24.6	24.5	22.2	25.5
70	19.0	17.0	20.1	19.9	17.9	21.0
75	14.7	13.1	16.0	15.5	14.0	16.8
80	10.9	9.8	12.3	11.7	10.6	13.0
85	7.8	7.2	9.0	8.5	7.8	9.6
90	5.6	5.2	6.3	6.1	5.7	6.7

The assumptions on rates of mortality and longevity improvement factors represent best-estimate assumptions regarding future demographic trends. Given the length of the projection period, it is unlikely that the actual experience will develop precisely in accordance with best-estimate assumptions. The following table measures the effect on the life expectancy when longevity improvement factors are varied.

Table 64 Sensitivity of Life Expectancy to Variation in Longevity Improvement Factors

	Age 65 Life Expectancy in 2019			Age 65 Life Expectancy in 2036		
	Male			Male		
Longevity improvement factors	Officer	Other Rank	Female	Officer	Other Rank	Female
Current basis	23.6	21.2	24.6	24.5	22.2	25.5
- if 0%	21.7	19.2	22.9	21.7	19.2	22.9
- if ultimate 50% higher	23.8	21.3	24.8	25.1	22.7	26.1
- if ultimate 50% lower	23.5	21.1	24.5	24.0	21.7	25.0
- if kept at 2020 level	24.7	22.2	25.4	26.9	24.7	27.3

G.1.9 Family Composition[1]

The assumptions regarding spouse survivors for both Regular and Reserve Force members were revised based on the intervaluation experience. The probability of leaving, upon death, a spouse eligible for a survivor pension was increased from the previous valuation by an average of 2% for male members while the previous assumption for female members were increased by an average of 5%. The assumption for the age difference of the spouse at the time of death of the member was marginally reduced for male members but remains unchanged from the previous valuation for female members.

[1] Survivor pensions are not payable if the deceased member has less than two years of pensionable service.

Table 65 Assumptions for Survivor Spouse Allowances

Age Last Birthday	Probability of an Eligible Spouse at Death of Member		Spouse Age Difference	
	Male	Female	Male	Female
30	0.51	0.48	(1)	1
40	0.70	0.52	(2)	2
50	0.70	0.54	(2)	1
60	0.73	0.51	(2)	0
70	0.73	0.48	(3)	(1)
80	0.60	0.43	(3)	(2)
90	0.39	0.26	(4)	(4)
100	0.12	0.00	(7)	(7)

The assumptions regarding the average number of eligible children for both Regular and Reserve Force members were revised for male members based on the intervaluation experience. The assumptions for female members remained unchanged from the previous valuation.

For male members, age 30 and below, the average number of children assumption was decreased on average by 21%. Between the ages of 31 and 50, the average number children assumed to be eligible for a survivor allowance increased by an average of 1%. Above age 50, the average number of children decreased by an average of 1%.

The assumption regarding the average age of eligible children was changed from the previous report by one year at select ages. As in the previous valuation, to determine the value of pensions payable to eligible children, the rates of pension termination were assumed to be 0% prior to age 17 and 16% per annum thereafter until expiry of the benefit on the 25th birthday.

Table 66 Assumptions for Survivor Children Allowances

Age Last Birthday at Death	Average Number of Children		Average Age of Children	
	Male	Female	Male	Female
30	0.6	0.7	4	5
40	1.4	0.8	10	13
50	0.4	0.3	14	17
60	0.1	0.0	17	-
70	0.0	0.0	-	-

G.2 Other Assumptions

G.2.1 Pension Benefits Division/Optional Survivor Benefit/Leave Without Pay

The division of pension benefits has almost no effect on the valuation results because the liability is reduced, on average, by approximately the amount paid to the credit of the former spouse. Consequently, no future pension benefits divisions were assumed in estimating the current service cost and liability. However, past pension benefits divisions were fully reflected in the liability. Two other provisions, namely the optional survivor benefit and the suspension of membership while on leave without pay, were also treated like pension benefits divisions for the same reason.

G.2.2 Minimum Post-Retirement Death Benefit

This valuation does not take into account the minimum death benefit described in section A.5.21, with respect to deaths occurring after retirement. The resulting understatement of the accrued liability and current service cost is not material since the majority of the relatively few pensioners who die in the early years of retirement leave an eligible survivor.

G.2.3 Administrative Expenses

The operating expenses of the PSPIB continue to be recognized implicitly in this report.

Beside the additional administration cost associated with the Pension Modernization, all other pension plan administrative expenses are charged to the Superannuation Account, the CFPF and the RFPF.

For the Regular Force Plan, the annual administrative expenses assumption was decreased from 0.75% to 0.55% of total pensionable payroll and remained at the same 1.75% of total pensionable payroll for the Reserve Force Plan. These revisions for the Regular Force Plan is based on the observed experience over the intervaluation period. For plan year 2020, the Superannuation Account is assumed to be charged with 50.2% of total administrative expenses, reducing by 2.5% each year thereafter. The future expenses expected to be charged to the Superannuation Account have been capitalized and are shown as a liability, whereas the expenses to the CFPF and RFPF have been recognized as a part of the annual current service cost.

G.2.4 Wage Measure

Under the Reserve Force Plan, the retirement benefit is based on the career average of the updated earnings. Past earnings are updated using the wage measure as defined in the schedule of the Reserve Force Pension Plan Regulations. The regulations also prescribe the wage measures for calendar year 2007 and later as the greater of:

- the standard basic rate of pay for a period of duty or training of six hours or more, before any retroactive adjustment , that was prescribed or established under the *National Defence Act* to be paid on October 1 of the preceding year to a member at the rank of Corporal (class A), and
- the wage measure of the previous year.

The wage measure for calendar years up to 2019 is shown in the following table.

Table 67 Wage Measure - RFPF

Calendar Year	Rate of Pay ($)	Calendar Year	Rate of Pay ($)
2019	140.12	1989	50.80
2018	140.12	1988	47.27
2017	131.74	1987	43.90
2016	131.74	1986	41.50
2015	131.74	1985	40.00
2014	131.74	1984	38.25
2013	129.16	1983	36.25
2012	125.08	1982	33.25
2011	125.08	1981	29.25
2010	123.24	1980	25.75
2009	121.42	1979	25.75
2008	116.70	1978	24.50
2007	113.70	1977	21.00
2006	113.70	1976	21.00
2005	104.18	1975	17.37
2004	104.18	1974	12.20
2003	101.64	1973	12.20
2002	97.72	1972	12.10
2001	89.52	1971	10.50
2000	89.52	1970	10.10
1999	83.42	1969	7.17
1998	80.82	1968	7.17
1997	61.68	1967	7.17
1996	60.36	1966	7.17
1995	60.36	1965	6.50
1994	60.36	1964	6.50
1993	60.36	1963	6.50
1992	58.60	1962	6.23
1991	58.60	1961	6.23
1990	54.50	1960	5.67

G.2.5 Financing of Elected Prior Service

The assumed future government credits in respect of prior service elections vary according to the financing vehicle (i.e. the Superannuation Account, the CFPF or the RFPF) into which the contributions are credited. The government matches member contributions made to the Superannuation Account for prior service elections; however, it makes no contributions if the member is paying the double rate. Government credits to the Pension Funds in respect of elected prior service are as described for the current service.

G.2.6 Outstanding Terminations

Amounts paid from 1 April 2019 onward for terminations that occurred prior to that date were estimated from actual payments made using historical information provided in the valuation data at 31 March 2019. For this valuation, after reviewing the information, a total of $83 and $10 million were set aside respectively for the CFPF and the RFPF.

G.2.7 Disability Incidence Rates for Pensioners Under Age 60

Both deferred pensioners and pensioners receiving an annual allowance while under age 60 were assumed to have a 0% disability rate. The resulting understatement of liability and current service cost is negligible.

G.2.8 Recovery Rates for Disability Pensioners

No recoveries are assumed for disability pensioners. The resulting overstatement of liability and current service cost is negligible.

G.2.9 Sex of Surviving Spouses

The sex of each eligible surviving spouse is assumed to be the opposite of the deceased member's.

Appendix H — RCA Valuation Methodology and Assumptions

H.1 Valuation of the Amounts Available for Benefits

The amounts available for benefits comprise the recorded balance in the Retirement Compensation Arrangements Account (RCA), which forms part of the Accounts of Canada, as well as a tax credit (CRA refundable tax).

Interest is credited every three months in accordance with the actual average yield on a book value basis for the same period on the combined Superannuation Accounts of the Public Service, Canadian Forces - Regular Force and Royal Canadian Mounted Police pension plans. The actuarial value of the amounts available for benefits is equal to the book value.

H.2 Valuation of Liabilities

Described in this appendix are the liability valuation methodologies used and any differences in economic assumptions from those used in the CFSA valuation.

H.2.1 Terminally Funded RCA Benefits

The following RCA benefits are being terminally funded (i.e. not prefunded but on an occurrence basis):

- pre-retirement survivor benefits
- minimum death benefit

The above benefits are terminally funded because they are uncommon or of little financial significance. The pre-retirement survivor benefit becomes payable only when the average salary is less than 1.4 times the YMPE. As well, the minimum death benefit is expected to occur only with deaths at younger ages where the mortality rates are low.

H.2.2 Post-Retirement Survivor Benefits

The limit on the amount of spousal annual allowance that can be provided under the CFSA decreases at the same time the member's pension reduces due to the CPP coordination, usually at age 65.

This benefit was valued conservatively by assuming the plan limit is always coordinated with the CPP. The liability overstatement is minor because the probability of the former contributor dying prior to age 65 is small. (This overstatement tends to be offset by the understatement of accrued liability caused by terminally funding the pre-retirement survivor benefit.) The projected accrued benefit cost method was used to estimate the liabilities and current service cost for this RCA benefit.

H.2.3 Excess Pensionable Earnings

The projected accrued benefit cost method (described in detail in Appendix E.2) was used to estimate plan liabilities and current service costs for benefits in excess of the Maximum Pensionable Earnings (MPE).

H.2.4 Administrative Expenses

To compute the liabilities and current service cost, no provision was made regarding the expenses

incurred for the administration of the RCA Account. These expenses, which are not debited to the RCA Account, are borne entirely by the government and are commingled with all other government expenses.

H.3 Actuarial Assumptions

The valuation economic assumptions described in Appendix F were used without any modifications.

H.4 Valuation Data

The RCA pension benefits in payment were provided as at 31 March 2019. RCA benefits expected to be paid in respect of contributor and accrued spousal allowances of current retired members were all derived from the membership data described in Appendix D and shown in Appendix K.

Appendix I — Canadian Forces Pension Plans Projection

The results of the following projection were computed using the amounts available for benefits described in Appendix C, the data described in Appendices D and K, the methodology described in Appendix A and the assumptions described in Appendices F and G.

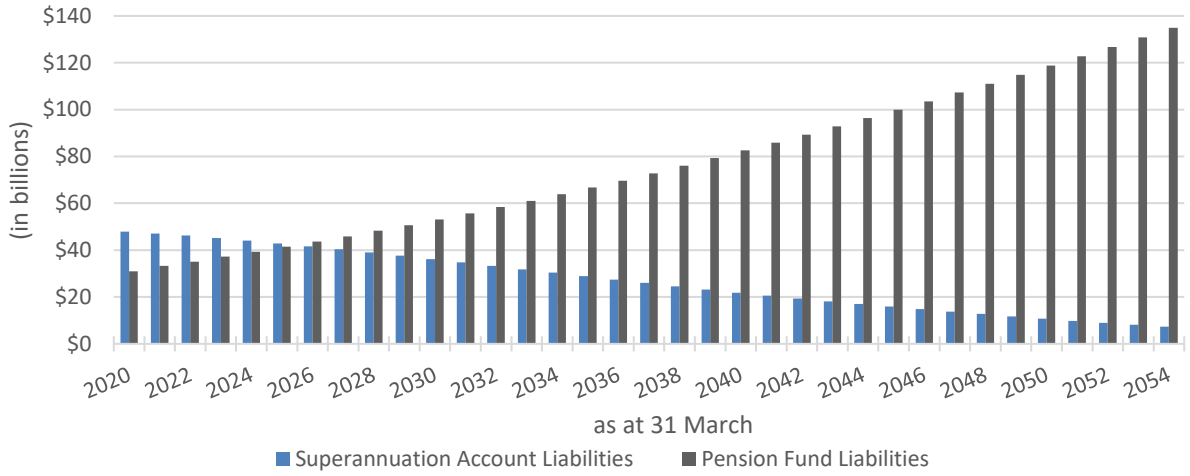
I.1 Projection of the Superannuation Account and the Canadian Force Pension Fund Liabilities

Prior to 1 April 2000, the CFSA Superannuation Account tracked all government pension benefit obligations related to the CFSA. The Superannuation Account is now debited only with benefit payments made in respect of service earned before that date and administrative expenses; it is credited with prior service related to elections made prior to 1 April 2000 and interest earnings.

Starting 1 April 2000, the CFSA is financed through the Canadian Forces Pension Fund (CFPF). Government and member contributions, investment earnings and prior service contributions for elections since 1 April 2000 are added to the CFPF. The Pension Fund is debited with benefit payments made in respect of service earned since that date and administrative expenses.

The following graph presents the evolution over time of the Superannuation Account liabilities for service prior to 1 April 2000 and the Pension Fund liabilities for service after 31 March 2000. It is expected that the Pension Fund liabilities will exceed the Superannuation Account liabilities in 2026.

Chart 1 Evolution of Liabilities of Superannuation Account and Pension Fund over Time



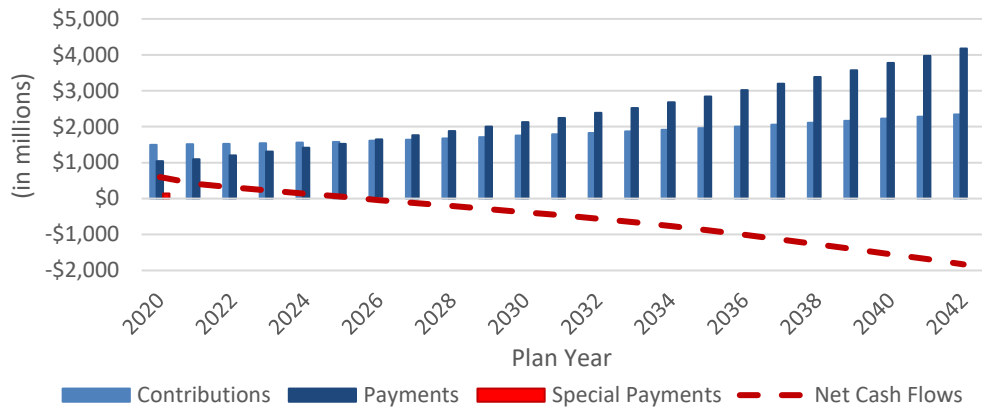
I.2 Evolution of Cash Flows under the Canadian Force Pension Fund

In plan year 2020, contributions to the Pension Fund are expected to reach $1,497 million, whereas payouts, including benefit payments and administrative expenses, are expected to reach $1,042 million. Contributions that are higher than payouts ensure that the Pension Fund has sufficient liquidity to cover all the payouts in a year. However, as the population of the Pension Fund matures, the amount of payouts will increase and will eventually exceed the contributions. This will result in negative cash flows to the Pension Fund.

It is expected that the Pension Fund will have negative cash flows from plan year 2026, at which point a portion of the assets will be required to pay benefits. This implies that from plan year 2026, some portion of the Pension Fund's assets must be invested in liquid investments in order to be readily

available to cover the excess payouts. Nevertheless, it should be noted that although negative cash flows will begin in the plan year 2026, the Pension Fund's overall assets are expected to grow for the entire duration of the projection presented below when investment incomes are taken into consideration.

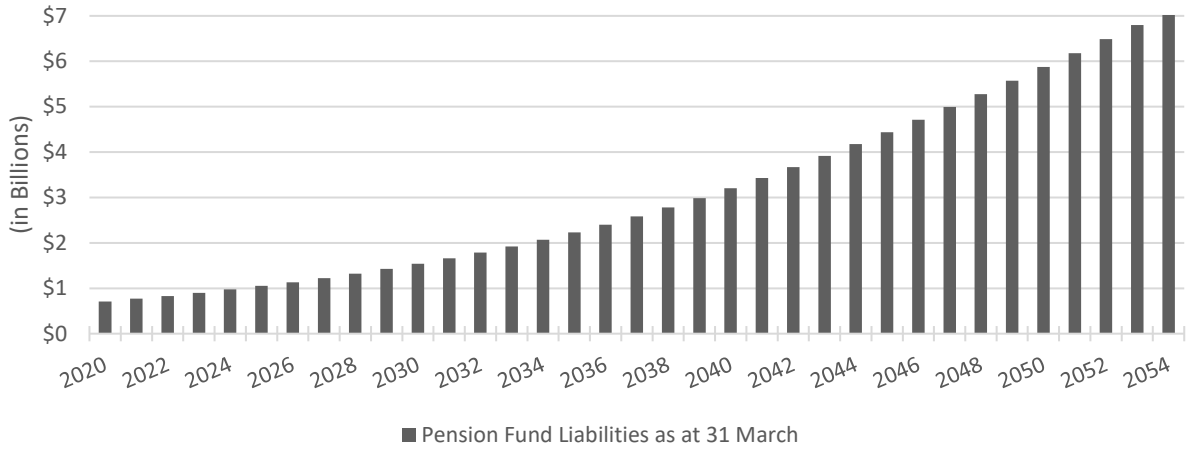
Chart 2 Evolution of Cash Flows of the CFPF over Time



I.3 Projection of the Reserve Force Pension Fund Liabilities

The Reserve Force Plan was established on 1 April 2007 and is financed through the Reserve Force Pension Fund (RFPF). Government and member contributions, investment earnings and prior service contributions for elections are invested in the RFPF. The Pension Fund is debited with benefit payments made in respect of service earned since the establishment date and administrative expenses.
The following graph presents the evolution over time of the Pension Fund liabilities for service under the Reserve Force Plan.

Chart 3 Evolution of Liabilities of the Reserve Force Pension Fund over Time

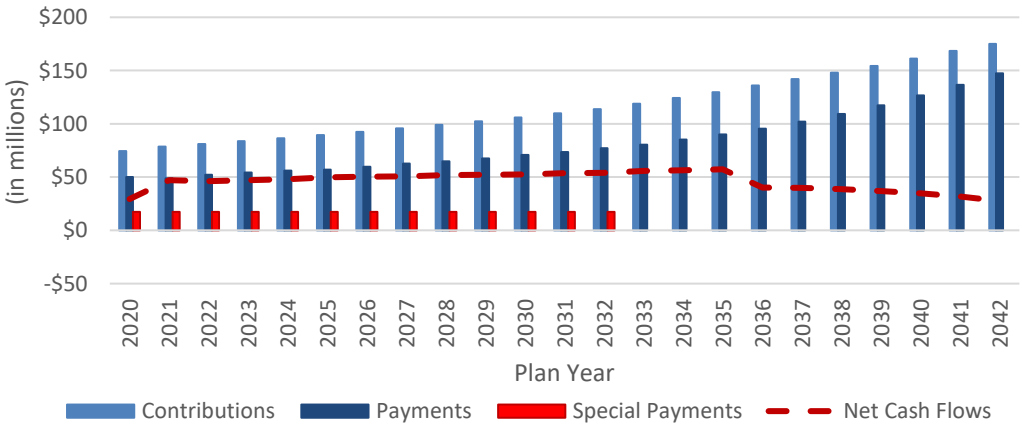


I.4 Evolution of Cash Flows under the Reserve Force Pension Fund

In plan year 2020, contributions to the Pension Fund are expected to reach $81 million, whereas payouts, including benefit payments and administrative expenses, are expected to reach $50 million. Contributions that are higher than payouts ensure that the Pension Fund has sufficient liquidity to cover all the payouts in a year. However, as the population of the Pension Fund matures, the amount of payouts will increase and will eventually exceed the contributions. This will result in negative cash flows to the Pension Fund.

It is expected that the Pension Fund will have negative cash flows from plan year 2046, at which point a portion of the assets will be required to pay benefits. This implies that from plan year 2046, some portion of the Pension Fund's assets must be invested in liquid investments in order to be readily available to cover the excess payouts. Nevertheless, it should be noted that although negative cash flows will begin in the plan year 2046, the Pension Fund's overall assets are expected to grow for the entire duration of the projection presented below when investment incomes are taken into consideration.

Chart 4 Evolution of the Reserve Force Pension Fund Cash Flows over Time



Appendix J — Uncertainty of Results

J.1 Introduction

The projected financial status of the CFPF depends on many demographic and economic factors, including new contributors, average earnings, inflation, level of interest rates and investment returns. The projected long-term financial status of the CFPF is based on best-estimate assumptions. The objective of this section is to present alternative scenarios. The alternatives presented illustrate the sensitivity of the long-term projected financial position of the CFPF to changes in the future economic outlook. In this appendix, any references in Sections J.2 and J.3 relate to the CFPF only while Section J.4 relates to both the CFPF and the Superannuation Account. Due to its relative small size, results for the RFPF are not presented in this appendix.

Section J.2 examines the sensitivity of the CFPF to different asset allocations. Four alternative investment portfolios are described, along with the volatility of each portfolio and the resulting impact of having the assets invested in each portfolio on the CFPF's funding ratio and current service cost. Section J.2 also presents a stochastic projection of the CFPF's funding ratio. The impact of financial market volatility on the financial status of the CFPF is explored in Section J.3, where a severe one-time financial shock is applied to the three selected investment portfolios with the purpose of quantifying the impact on the funding ratio over the short-term horizon. Lastly, the impacts of prolonged low bond yields on the Superannuation Account and on the CFPF due to slower than expected economic growth are analyzed in Section J.4.

J.2 Sensitivity of Investment Policy – CFPF

A major risk all pension plans face is funding risk – the risk that pension assets are insufficient to meet pension obligations. If funding deficiencies or surpluses continue for an extended period of time, risk is transferred from one generation to another and may ultimately take the form of an increase or a decrease in the contribution rate. The Regular Force Plan represents a long-term obligation to pay pension benefits. Thus, a long-term approach must be taken to fund these obligations.

Historically, equities have shown greater volatility than fixed income instruments (such as bonds); and long-term bonds have historically shown greater volatility than shorter term fixed income instruments. For instance, in the twenty-five years ending in 2018, the volatility (standard deviation) of Canadian equity returns (indicated by the S&P/TSX Total Return Index) was 16.3%[1], the volatility of returns of the long-term federal bonds (10+ years) was 9.1% and the volatility of returns of the medium-term federal bonds (5-10 years) was 6.2%. Higher volatility in the returns implies a greater risk due to a wider range of possible outcomes of the returns. Hence, an investment in equities is considered riskier than an investment in bonds and an investment in long-term bonds is riskier than an investment in medium- or short-term bonds.

This also means that investing a greater proportion of assets in equities can provide a wider range of possible returns, with a higher expected return. Conversely, investing in fixed income instruments only provides a narrower range of possible returns, with a lower expected return.

[1] Source: the Canadian Institute of Actuaries' Report on Canadian Economic Statistics 1924 – 2018.

Long-term Government of Canada bonds are considered risk-free[1] and their yields are considered low. The real yield on long-term federal bonds was approximately negative 0.40% in plan year 2020.This is significantly below the ultimate best-estimate real return on assets of 4.0% that is currently used to determine the liabilities and current service costs and special payments if applicable.

The government created the PSPIB to actively manage assets consisting of the contributions in excess of the benefits and the administrative expenses with respect to service since 1 April 2000 in order to maximize the investment return on these assets without undue risk of loss. Due to active asset management, the liabilities and current service costs are less than what they would have been if the investment policy had been restricted to solely invest in long-term government bonds.

Although the current service cost is reduced by investing in securities that offer a higher rate of return than the risk-free[2] long-term federal bonds, the portfolio is also exposed to a greater degree of risk or volatility. Generally, an investment in riskier assets demands risk premiums to compensate for additional risk. A risk premium is the difference between the expected return on a risky asset (e.g. equities) and the expected return on a risk-free asset, such as the Government of Canada long-term bond mentioned above.

Of course, these higher returns are expected but not guaranteed with the possibility that the market will not perform as expected and liabilities will grow at a faster rate than investments for an extended period of time. Even if investment returns materialize as expected, other assumptions may not, causing the liabilities to grow at a faster rate than the assets. For example, salaries or inflation may increase more than expected. The amount of risk assumed by the plan sponsor depends on many factors, including the current funding status and economic outlook, among other things. Thus, the investment policy balances the desire for a high real rate of return with the sponsor's ability to take risk and/or tolerance for risk. The Funding Policy for the Public Sector Pension Plans sets out some boundaries for the level of investment risk that is acceptable to the plan sponsor.

The following table the impacts on the funding ratio, the current service cost for plan year 2025 and the relative volatility with respect to various asset mixes.

Table 68 Impact of Various Investment Policies - CFPF

	Asset Mix				Real Rate of Return					
Portfolio	Fixed Income	Equity	Credit	Real Assets	First 5 Years	Ultimate	1-year Standard Deviation	Funding Ratio as at 31 March 2019	Current Service Cost for Plan Year 2025	Annual Special Payment ($ millions)
#1	100%[3]	0%	0%	0%	(1.6%)	2.8%	6.5%	55%	44.8%	1,800
#2	55%[4]	35%	5%	5%	1.8%	3.5%	7.2%	84%	31.5%	530
#3	40%[4]	40%	5%	15%	2.5%	3.7%	9.0%	92%	29.1%	255
Best-Estimate	20%[4]	43%	7%	30%	3.4%	4.0%	11.4%	102%	26.4%	0
#4	0%	100%	0%	0%	4.4%	4.4%	16.8%	116%	23.3%	0

1 In this Section, "risk-free" refers to the default risk. A risk-free bond is still subject to return volatility given the changes in interest rates.
2 Long-term federal bonds are considered risk-free since they have no risk of default. However, their market value is volatile and therefore long-term federal bonds do exhibit market and funding risk over the course of their life.
3 Mixture of long-term federal, provincial, and real return bonds.
4 A diversified portfolio (federal, provincial and real return) of bonds with various maturities.

The last three columns of Table 68 present the funding ratio, annual special payments over the 15 years following the valuation date and the plan year 2025 current service cost for the Regular Force Plan if the investment policy was changed to reflect the asset mix of the alternative portfolios. These deterministic outcomes do not take into account the expected portfolio volatility.

The best-estimate portfolio is invested 20% in fixed-income securities, 43% in equity, 30% in real assets and 7% in credit in the long-term, which is close to PSPIB's current long-term asset-mix objective. Such a portfolio produces an ultimate annual real return of 4.0% net of all investment expenses (assumed 0.20% of total assets) with a standard deviation of 11.4%.

Portfolio #1 is invested in a marketable bond portfolio consisting of long-term federal, provincial and real return bonds. Compared with the other portfolios, this portfolio has lower volatility and produces a lower real rate of return, thus resulting in a higher current service cost. Greater diversification in various assets is required in order to have lower levels of funding cost.

Portfolios #2 and #3 are more diversified than Portfolios #1. They include 35% and 40%, respectively, of equity investments as well as investments in credit and real assets. This diversification in four broad asset categories that are not perfectly correlated, combined with shorter fixed-income maturities, increases the real rate of return earned on these portfolios and keeps their volatilities somewhat comparable to Portfolios #1. Portfolios #2 and #3, because of their higher expected returns, have expected current service costs lower than the first portfolio but higher than the best-estimate portfolio. Portfolio #4 is considered riskier than all portfolios mentioned above because it is less diversified and has no allocation to fixed income securities. This portfolio is solely invested in equity, which has much more volatile returns than that of bonds. Although Portfolio #4 leads to the highest expected return, the highest funding ratio and the lowest current service cost, its volatility is significantly higher which may lead to significant additional contribution requirements if a tail event were to occur as illustrated in Table 69.

Table 69 presents the expected median and the 10 percent downside real returns over the next three years[1], the resulting funding ratio, and the ensuing expected contributions assuming the plan is fully funded as at 31 March 2019 under each portfolio. It further assumes that the ultimate real rate of return applies to the full projection period (no select period with lower real rates of return).

[1] The 10 percent downside real returns over the next 3 years represent the expected 10th percentile average return over that period. That is, there is a 10% probability that the average real returns over the next 3 years will be lower than the 10 percent downside real returns.

Table 69 Median and 10% Downside Returns, Funding Ratio and Contributions for Various Portfolios - CFPF

		Expected Average Annual Real Returns [1] (2020-2022)		Funding Ratio (31 March 2022)		Contributions (2022-23) % of pensionable payroll ($ millions)		
Portfolio	1-year Standard Deviation	Downside 10th Pct	Median	Downside 10th Pct	Median	Current Service Cost (downside and median)	Special Payments (downside)	Total (downside)
#2	7.2%	-1.9%	3.5%	94%	100%	28.7% (1,598)	4.5% (250)	33.2% (1,848)
#3	9.0%	-3.0%	3.7%	91%	100%	27.5% (1,526)	6.7% (371)	34.1% (1,897)
Best-Estimate	11.4%	-4.4%	4.0%	86%	100%	25.7% (1,427)	9.6% (536)	35.3% (1,963)
#4	16.8%	-8.2%	4.4%	78%	100%	23.5% (1,308)	14.8% (820)	38.3% (2,128)

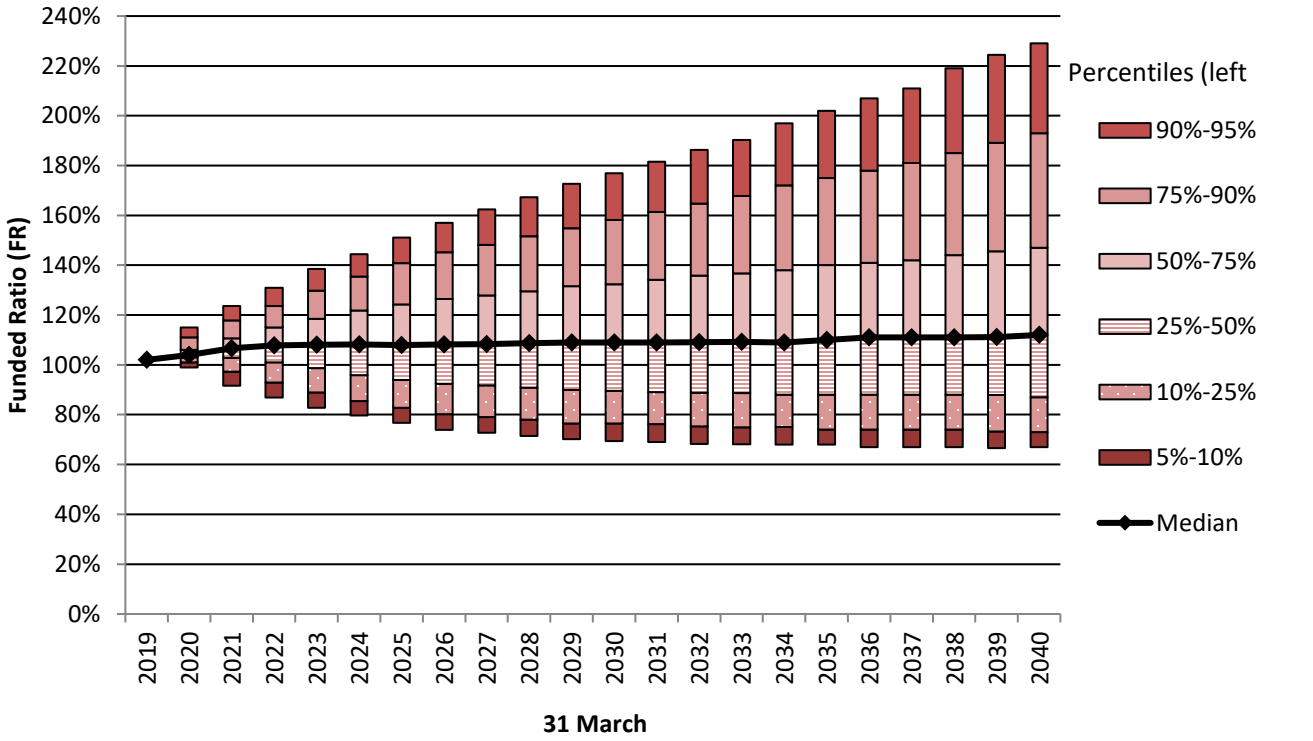
Table 69 highlights the trade-off between risk and return as well as between higher current service cost with low downside risk and lower current service cost with high downside risk. A portfolio (Portfolio #2) exhibiting lower volatility of returns has a higher current service cost, but a lower downside risk. On the other hand, a risky portfolio (Portfolio #4) would produce a lower current service cost; however, the volatility of this portfolio is quite high, resulting in significant downside risk and therefore more total downside contributions compared to Portfolio #2 or best-estimate portfolio. By investing in a diversified portfolio, a reasonable current service cost can still be achieved along with lower volatility and lower downside risk than Portfolio #4, hence a lower probability of significant losses and unforeseen additional contributions.

[1] For illustration purposes, it is assumed that ultimate returns apply for the entire projection period. Annual returns are assumed to follow a normal distribution and are assumed to be independent between the years (no mean reversion).

The following chart illustrates the range of funding ratio (actuarial value of assets over actuarial liabilities) that could be expected under the best estimate portfolio. It takes into account that actuarial valuation would occur every three years starting in 2019, that deficits are covered by additional government contributions and that legislated non-permitted surplus (surplus in excess of 25% of liabilities) results in full or partial contribution holiday for the government[1].

As shown in Chart 5, the median expected funding ratio is relatively flat (between 102% and 109%) over the projection.

Chart 5 Range of Potential Funding Ratio for the Best-Estimate Portfolio - CFPF



J.3 Financial Market Tail Events – CFPF

This section focuses on the inherent volatility in the best-estimate portfolio and the extreme outcomes that could result. During plan year 2009, the nominal return on Plan assets was negative 22.7% due to the economic slowdown. Such an event could be characterized as low probability (also referred to as a "tail event"). However, when these events do occur, the impact on the funding ratio may be significant. This section analyzes the impacts that tail-event returns would have on the plan's funding ratio. To illustrate this, returns other than the best-estimate are assumed to occur in plan year 2020. Two alternative portfolios were selected from Section J.2 to show the potential variation in tail returns of a less risky portfolio (Portfolio #3: 40% fixed income, 40% equity, 15% real assets and 5% credit) and a more risky portfolio (Portfolio #4: 100% equity) in relation to the best-estimate portfolio.

[1] The legislation requires that the government stops contributing to the fund when there is a non-permitted surplus. The government may withdraw the non-permitted surplus and may also reduce employee contribution. As these actions are not automatic, they are not modeled.

It is assumed that the returns of the three portfolios follow a normal distribution. The annual long-term mean and standard deviation for each portfolio is given in Table 70. Returns at two probability levels were selected to analyze: 1/10 and 1/50. The probabilities of earning these returns can be thought of as once in every 10 and 50 years, respectively. Since the normal distribution has two tails, left and right, both were examined. The left tail event is the occurrence of a nominal return such that the probability of earning that return or less is equal to 1/10 (or 1/50). The right tail event is the occurrence of a nominal return such that the probability of earning that return or more is equal to 1/10 (or 1/50).

For each portfolio, a nominal return is calculated at the two probability levels. These returns are given in the following table.

Table 70 Tail Event Portfolio Returns - CFPF

Probability of return [1]	Tail	Portfolio #3: 40% Fixed Income/ 40% Equity/ 15% Real Assets/ 5% Credit	Best-Estimate Portfolio: 20% Fixed Income/ 43% Equity/ 30% Real Assets/ 7% Credit	Portfolio #4: 100% Equities
		Nominal Return	Nominal Return	Nominal Return
1/50	Left	(12.4%)	(16.7%)	(26.7%)
1/10	Left	(5.5%)	(7.9%)	(13.7%)
1/10	Right	17.7%	21.2%	29.3%
1/50	Right	24.6%	30.0%	42.3%

Table 71 presents the impact on the projected surplus/(deficit) as at 31 March 2022 (the expected date of the next actuarial review) if the nominal return for plan year 2020 happens to be equal to the returns presented in Table 70 for the best-estimate scenario. Following the various portfolio returns in plan year 2020, it is assumed that the return will revert to its best-estimate value for plan year 2021 and 2022.

Table 71 Sensitivity of the Projected CFPF Surplus/(Deficit) as at 31 March 2022
($ millions)

Assumption(s) Varied	Actuarial Value of Assets	Liability	Surplus/ (Deficit)	Annual Special Payments [2]
None (i.e. current basis)	39,987	37,181	2,806	0
Investment return				
- Left Tail event at 1/50th probability	31,705	37,181	(5,476)	549
- Left Tail event at 1/10th probability	34,922	37,181	(2,259)	226
- Right Tail event at 1/10th probability	45,595	37,181	8,414	0
- Right Tail event at 1/50th probability	48,808	37,181	11,627	0

[1] The probability of earning a positive return in the table corresponds to the probability that the annual return is greater than or equal to the indicated return. Similarly, the probability of earning a negative portfolio return corresponds to the probability of earning the indicated return or less.

[2] Equal annual special payments to amortize the deficit over the next 15 years starting 31 March 2023.

J.4 Impact of Prolonged Low Bond Yields – CFPF and Superannuation Account

This section explores the consequences of slower than expected economic growth through a reduction in expected bond yields and variable income securities over the full projection period. Current bond yields are much lower than their historical averages and, without stronger economic growth, they might well remain low over the next few years. Over the last 15- and 50-year periods ending 31 December 2018, the average real yield of long-term Government of Canada bonds was 1.5% and 3.1%, respectively. This is much higher than the negative 0.40% real yield on long-term federal bonds in plan year 2020. This section looks at the impact of keeping the best-estimated real yield for the first 5 years (plan years 2020 – 2024) and reducing all subsequent long-term federal bond yields by 0.3%.

The best-estimate scenario assumes that the long-term federal bond real (nominal) yield reaches its ultimate value of 2.5% (4.5%) at the beginning of plan year 2036. The scenario examined in this subsection assumes that the economic growth will remain weak until plan year 2025 and moderate thereafter. Consequently, the long-term federal bond nominal yield would remain at low level over the next 5 years, and would slowly progress towards its ultimate real (nominal) value of 2.2% (4.2%) by plan year 2036. As a result, the new money rate for plan years 2025 and beyond would also be affected and would be 0.3% lower than in best-estimate scenario. In addition, returns for equity and real assets would also be lower for the entire projection period. Thus, the annual returns would be 0.2% lower on average over the next 10 years and 0.3% lower ultimately than under the best-estimate scenario.

Table 72 shows the impact that such a scenario would have on the expected new money rates and projected fund returns, as well as the impact on the actuarial liabilities, the current service cost for plan year 2025 and the annual special credits/payments required to fund the Superannuation Account shortfall and the CFPF deficit.

Table 72 Impact on the Superannuation Account / CFPF of Prolonged Low Bond Yields
($ millions)

Superannuation Account	Best-Estimate	Low Bond Yields	Difference
2020-2029 Average New Money Rate	2.3%	2.1%	(0.2%)
Ultimate Average New Money Rate	4.5%	4.2%	(0.3%)
Total Actuarial Liability as at 31 March 2019	48,057	48,532	475
Actuarial Excess/(Shortfall)	(2,427)	(2,902)	(475)
Special Credits	211	252	41
Pension Fund	**Best-Estimate**	**Low Bond Yields**	**Difference**
2020-2029 Average Return Projected on Fund	5.3%	5.1%	(0.2%)
Ultimate Average Return Projected on Fund	6.0%	5.7%	(0.3%)
Total Actuarial Liability as at 31 March 2019	31,007	32,452	1,445
Actuarial Surplus/(Deficit)	579	(866)	(1,445)
Current Service Cost for Plan Year 2025	26.4%	28.2%	1.8%
Special Payments	0	74	74

As shown in the table above, the prolonged low bond yields result in higher actuarial liability and higher special credits/payments for both the Superannuation Account and the CFPF.

Appendix K — Detailed Information on Membership[1]

In this appendix, the 'Age' and 'Service' nomenclature refers to completed years calculated at the beginning of the plan year.

Table 73 Regular Force - Male Officers
Number and Average Annual Earnings [2] as at 31 March 2019

Age	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	All Years of Service
15-19	406 $27,334								406 $27,334
20-24	1,135 $37,141	308 $63,492							1,443 $42,765
25-29	814 $60,188	978 $79,659	346 $88,307						2,138 $73,645
30-34	394 $67,973	628 $91,473	1,102 $96,561	308 $106,394					2,432 $91,861
35-39	163 $79,768	307 $93,565	707 $105,147	960 $107,493	209 $116,599				2,346 $103,848
40-44	110 $79,871	119 $91,299	334 $108,204	587 $116,017	712 $117,001	164 $128,039			2,026 $112,633
45-49	60 $79,979	85 $94,182	152 $106,046	235 $116,786	365 $119,478	690 $122,873	182 $125,204		1,769 $117,325
50-54	26 $88,999	64 $106,080	91 $108,014	100 $115,448	105 $116,580	319 $126,254	699 $122,972	99 $127,624	1,503 $120,815
55-59	8 $95,612	34 $102,659	69 $115,226	42 $114,181	35 $129,902	97 $121,733	324 $124,439	216 $123,152	825 $121,546
60-64[3]		1 -	4 $171,982	1 -	2 $98,934	4 $95,502	7 $103,575	7 $102,078	26 $112,177
All Ages	3,116 $50,928	2,524 -	2,805 $100,546	2,233 -	1,428 $117,835	1,274 $124,212	1,212 $123,588	322 $124,069	14,914 $95,066

Table 74 Regular Force - Male Officers - Summary

	31 March 2019	31 March 2016
Average age	37.3	38.1
Average pensionable service	14.6	14.7
Annualized pensionable payroll [4]	$1,417,814,974	$1,317,989,709
Total PBDA indexed reduction to basic annuity	$4,348,969	$4,044,409

[1] Certain values are left blank to protect the confidentiality of plan members.
[2] As defined in section A.5.1 of Appendix A.
[3] As at 31 March 2019 these members are treated as pensioners.
[4] The aggregate pensionable earnings of all contributors with less than 35 years of pensionable service.

Total PBDA indexed reduction adjustment	$752,982	705,478

Table 75 Regular Force - Male Other Ranks
Number and Average Annual Earnings [1] as at 31 March 2019

Age	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	All Years of Service
15-19	865 $38,119								865 $38,119
20-24	5,960 $48,829	587 $62,707							6,547 $50,073
25-29	3,791 $52,383	4,277 $65,034	1,100 $67,294						9,168 $60,074
30-34	1,338 $54,308	2,650 $66,417	4,544 $68,574	589 $70,956					9,121 $66,008
35-39	456 $55,239	1,012 $66,828	2,516 $69,751	2,976 $73,550	278 $73,691				7,238 $70,142
40-44	188 $53,338	407 $66,493	1,006 $70,075	1,731 $74,332	1,535 $77,040	134 $78,058			5,001 $72,979
45-49	93 $53,461	204 $66,999	420 $69,372	537 $73,615	861 $77,556	1,212 $81,814	241 $81,327		3,568 $76,469
50-54	47 $54,456	118 $67,222	180 $68,350	207 $72,895	226 $75,511	536 $79,787	1,188 $84,155	95 $83,938	2,597 $79,193
55-59	14 $53,488	63 $66,967	91 $67,528	66 $69,735	58 $74,768	131 $74,447	322 $81,566	326 $82,919	1,071 $77,591
60-64[2]			3 $69,469		2 -	3 $67,934	1 -	4 $77,366	13 $70,544
All Ages	12,752 $50,089	9,318 $65,623	9,860 $68,905	6,106 $73,464	2,960 -	2,016 $80,526	1,752 -	425 $83,095	45,189 $65,255

Table 76 Regular Force - Male Other Ranks - Summary

	31 March 2019	31 March 2016
Average age	34.1	34.4
Average pensionable service	11.5	11.4
Annualized pensionable payroll [3]	$2,948,800,985	$2,910,652,558
Total PBDA indexed reduction to basic annuity	$5,062,331	$6,181,203
Total PBDA indexed reduction adjustment	$1,238,954	$1,544,662

1 As defined in section A.5.1 of Appendix A.
2 As at 31 March 2019 these members are treated as pensioners.
3 The aggregate pensionable earnings of all contributors with less than 35 years of pensionable service.

Table 77 Regular Force - Female Officers
Number and Average Annual Earnings [1] as at 31 March 2019

Age	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	All Years of Service
15-19	122 $26,746								122 $26,746
20-24	293 $39,265	54 $67,030							347 $43,586
25-29	233 $60,928	248 $81,065	95 $87,860						576 $74,040
30-34	131 $73,321	126 $103,972	289 $97,745	89 $110,005					635 $95,660
35-39	79 $65,441	72 $95,234	167 $102,728	286 $109,501	72 $112,494				676 $101,478
40-44	33 $74,311	41 $90,487	108 $103,872	134 $117,008	186 $115,638	43 $112,237			545 $108,981
45-49	16 $59,182	21 $92,438	45 $115,100	54 $129,289	81 $119,408	110 $115,831	31 $108,759		358 $114,062
50-54	7 $93,101	10 $106,928	29 $103,377	39 $130,440	26 $130,424	51 $132,650	81 $123,491	10 $130,964	253 $123,616
55-59		9 $94,756	10 $119,939	12 $126,874	8 $103,323	13 $110,678	18 $118,843	33 $122,289	103 $116,648
60-64[2]				1 -		1 -		2 $140,992	4 $122,276
All Ages	914 $52,286	581 $88,217	743 $100,061	615 -	373 -	218 -	130 -	45 $125,048	3,619 $92,397

Table 78 Regular Force - Female Officers - Summary

	31 March 2019	31 March 2016
Average age	35.8	36.4
Average pensionable service	12.9	12.6
Annualized pensionable payroll [3]	$334,384,572	$282,097,867
Total PBDA indexed reduction to basic annuity	$145,306	$96,514
Total PBDA indexed reduction adjustment	$23,941	$15,344

1 As defined in section A.5.1 of Appendix A.
2 As at 31 March 2019 these members are treated as pensioners.
3 The aggregate pensionable earnings of all contributors with less than 35 years of pensionable service.

Table 79 Regular Force - Female Other Ranks
Number and Average Annual Earnings [1] as at 31 March 2019

Age	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	All Years of Service
15-19	85 $37,446								85 $37,446
20-24	677 $47,579	58 $62,515							735 $48,758
25-29	774 $51,005	491 $63,849	132 $66,412						1,397 $56,975
30-34	432 $51,346	385 $64,435	554 $67,013	88 $68,676					1,459 $61,794
35-39	210 $51,572	247 $64,189	450 $67,494	394 $71,237	59 $70,425				1,360 $65,647
40-44	119 $52,433	142 $63,983	286 $67,672	268 $72,959	205 $72,454	52 $67,816			1,072 $67,735
45-49	43 $50,912	76 $63,262	187 $67,235	188 $73,236	127 $74,972	219 $75,624	31 $73,534		871 $70,839
50-54	23 $51,300	44 $62,892	102 $68,172	115 $71,844	63 $74,282	92 $77,292	129 $80,881	11 $73,237	579 $72,871
55-59	2 $52,584	14 $61,064	43 $65,710	40 $69,096	32 $69,157	21 $72,770	39 $82,083	46 $74,404	237 $71,369
60-64[2]	1 -	4 $59,306	2 $63,904	3 $57,889		3 $64,649		2 $65,718	15 $61,617
All Ages	2,366 -	1,461 $63,923	1,756 $67,254	1,096 $71,744	486 -	387 $74,731	199 -	59 $73,892	7,810 $63,047

Table 80 Regular Force - Female Other Ranks - Summary

	31 March 2019	31 March 2016
Average age	36.2	36.8
Average pensionable service	11.0	11.0
Annualized pensionable payroll [3]	$492,395,662	$472,802,042
Total PBDA indexed reduction to basic annuity	$87,522	$101,980
Total PBDA indexed reduction adjustment	$22,770	$28,427

1 As defined in section A.5.1 of Appendix A.
2 As at 31 March 2019 these members are treated as pensioners.
3 The aggregate pensionable earnings of all contributors with less than 35 years of pensionable service.

Table 81 Reserve Force - Male Officers
Number and Average Annual Earnings[1] as at 31 March 2019

Age	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	All Years of Service
20-24	304 $19,498								304 $19,498
25-29	616 $16,056	33 $54,001							649 $17,986
30-34	591 $12,833	83 $48,749	4 $82,272						678 $17,640
35-39	387 $12,555	100 $34,137	10 $65,546						497 $17,964
40-44	369 $12,869	97 $35,501	12 $46,760	1 -					479 -
45-49	327 $12,769	114 $27,298	54 $39,796	6 $60,473	3 $90,457				504 $19,981
50-54	336 $13,290	83 $27,227	38 $42,621	21 $60,072	3 $54,640				481 $20,312
55-59	272 $12,882	72 $29,902	22 $36,412	7 $20,190	6 $80,347				379 $18,685
60+[2]	187 $9,742	17 $23,703	3 $39,188	2 -					209 -
All Ages	3,389 $13,861	599 $34,413	143 $43,586	37 -	12 $76,447				4,180 -

Table 82 Reserve Force - Male Officers - Summary

	31 March 2019	31 March 2016
Average age	40.2	39.7
Average pensionable service	3.4	9.0
Annualized pensionable payroll[3]	$74,568,600	$60,068,961

1 As defined in section A.5.1 of Appendix A.
2 As at 31 March 2019 these members are treated as pensioners.
3 The aggregate pensionable earnings of all contributors with less than 35 years of pensionable service.

Table 83 Reserve Force - Male Other Ranks
Number and Average Annual Earnings[1] as at 31 March 2019

Age	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	All Years of Service
15-19	352 $17,560								352 $17,560
20-24	2,718 $20,185	8 $49,354							2,726 $20,271
25-29	2,431 $16,611	276 $41,491							2,707 $19,148
30-34	1,107 $11,955	457 $27,166	14 $57,675						1,578 $16,766
35-39	510 $10,514	283 $20,017	39 $41,436						832 $15,196
40-44	324 $9,700	154 $18,615	47 $37,459	3 $65,017					528 $15,086
45-49	297 $10,665	166 $18,623	66 $23,943	22 $45,564	1 -				552 -
50-54	215 $8,529	89 $18,303	40 $21,999	13 $30,846	3 $65,773				360 $13,725
55-59	138 $8,085	60 $21,173	28 $24,012	4 $21,821	2 $55,097				232 $14,034
60+[2]	132 $6,867	10 $22,684		2 $56,917		1 -			145 -
All Ages	8,224 $15,830	1,503 $25,955	234 $31,267	44 $40,899	6 -	1 -			10,012 $17,852

Table 84 Reserve Force - Male Other Ranks - Summary

	31 March 2019	31 March 2016
Average age	31.0	29.9
Average pensionable service	3.1	6.3
Annualized pensionable payroll[3]	$177,882,760	$142,515,113

1 As defined in section A.5.1 of Appendix A.
2 As at 31 March 2019 these members are treated as pensioners.
3 The aggregate pensionable earnings of all contributors with less than 35 years of pensionable service.

Table 85 Reserve Force - Female Officers
Number and Average Annual Earnings[1] as at 31 March 2019

Age	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	All Years of Service
20-24	119 $13,479								119 $13,479
25-29	372 $12,269	7 $56,789							379 $13,091
30-34	352 $10,927	23 $42,231							375 $12,847
35-39	292 $11,703	41 $42,580	2 $56,978						335 $15,753
40-44	183 $10,499	38 $35,822	5 $38,628						226 $15,379
45-49	167 $11,800	39 $27,002	6 $40,724	4 $68,638					216 $16,400
50-54	152 $9,614	25 $29,983	6 $24,297	2 $83,146	2 $73,835				187 $14,282
55-59	131 $11,476	18 $32,074	5 $52,252	1 -	1 -				156 $15,231
60+[2]	90 $9,995	6 $43,047	1 -						97 -
All Ages	1,858 $11,403	197 $36,112	25 -	7 -	3 -				2,090 $14,317

Table 86 Reserve Force - Female Officers - Summary

	31 March 2019	31 March 2016
Average age	39.0	37.0
Average pensionable service	2.7	7.0
Annualized pensionable payroll[3]	$29,641,572	$23,311,164

1 As defined in section A.5.1 of Appendix A.
2 As at 31 March 2019 these members are treated as pensioners.
3 The aggregate pensionable earnings of all contributors with less than 35 years of pensionable service.

Table 87 Reserve Force - Female Other Ranks
Number and Average Annual Earnings[1] as at 31 March 2019

Age	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	All Years of Service
15-19	51 $17,208								51 $17,208
20-24	485 $22,784								485 $22,784
25-29	467 $19,840	54 $48,372							521 $22,798
30-34	244 $17,502	81 $25,069	3 $56,025						328 $19,723
35-39	114 $13,491	61 $24,640	11 $46,985						186 $19,128
40-44	80 $13,272	30 $28,139	8 $43,467						118 $19,099
45-49	72 $14,181	18 $31,429	6 $37,537	2 $21,616					98 $18,931
50-54	45 $9,856	15 $25,466	10 $27,484	4 $35,041		1 -			75 -
55-59	31 $8,680	10 $36,411	11 $32,150	1 -	1 -				54 -
60+[2]	18 $6,328	1 -							19 -
All Ages	1,607 $18,613	270 -	49 $38,497	7 -	1 -	1 -			1,935 $20,886

Table 88 Reserve Force - Female Other Ranks - Summary

	31 March 2019	31 March 2016
Average age	31.3	30.7
Average pensionable service	3.1	6.5
Annualized pensionable payroll[3]	$40,297,261	$33,439,523

1 As defined in section A.5.1 of Appendix A.
2 As at 31 March 2019 these members are treated as pensioners.
3 The aggregate pensionable earnings of all contributors with less than 35 years of pensionable service.

Table 89 Regular Force - Male Officers - Retirement Pensioners
Number and Average Annual Pension as at 31 March 2019

	Immediate Annuity (includes PBDA,CPP if applicable) [1]				Deferred annuity			
	SA/CFPF		RCA		SA/CFPF		RCA	
Age	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)
20-24	-	-	-	-	19	1,414	-	-
25-29	-	-	-	-	35	3,944	-	-
30-34	-	-	-	-	59	8,243	-	-
35-39	31	44,269	-	-	61	12,773	1	7
40-44	221	47,103	5	-	63	13,971	4	9,768
45-49	551	49,393	28	15,145	46	14,241	1	2,184
50-54	1,382	46,809	90	12,627	49	15,570	-	-
55-59	2,556	54,031	172	-	54	16,532	2	3,986
60-64	2,521	59,395	201	11,659	-	-	-	-
65-69	2,005	50,209	100	9,214	-	-	-	-
70-74	2,279	46,754	79	3,980	-	-	-	-
75-79	2,163	46,821	22	1,251	-	-	-	-
80-84	1,420	49,242	-	-	-	-	-	-
85-89	1,027	47,045	-	-	-	-	-	-
90-94	467	44,064	-	-	-	-	-	-
95-99	161	43,980	-	-	-	-	-	-
100-104	15	32,146	-	-	-	-	-	-
105+	2	9,749	-	-	-	-	-	-
All Ages	16,801	50,379	697	9,763	386	11,972	8	6,154

	31 March 2019	31 March 2016
Average age	68.4	67.4
Average age at retirement	48.8	48.3

[1] Includes annual allowance adjustments, PBDA reductions and CPP coordination if in effect at the valuation date.

Table 90 Regular Force - Female Officers - Retirement Pensioners
Number and Average Annual Pension as at 31 March 2019

	Immediate Annuity (includes PBDA,CPP if applicable) [1]				Deferred annuity			
	SA/CFPF		RCA		SA/CFPF		RCA	
Age	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)
20-24	-	-	-	-	4	1,206	-	-
25-29	-	-	-	-	4	6,181	-	-
30-34	-	-	-	-	16	8,800	-	-
35-39	12	43,237	-	-	27	11,366	-	-
40-44	69	45,350	2	39,137	16	17,197	1	-
45-49	106	46,000	5	22,975	15	13,035	3	1,902
50-54	196	40,918	20	15,665	11	18,835	1	-
55-59	238	44,255	20	10,230	13	17,772	1	4,035
60-64	235	49,319	14	12,680	-	-	-	-
65-69	152	42,608	12	8,562	-	-	-	-
70-74	90	36,253	4	2,341	-	-	-	-
75-79	52	36,075	2	3,314	-	-	-	-
80-84	28	38,992	-	-	-	-	-	-
85-89	19	32,394	-	-	-	-	-	-
90-94	17	29,351	-	-	-	-	-	-
95-99	6	-	-	-	-	-	-	-
100-104	1	-	-	-	-	-	-	-
All Ages	1,221	43,139	79	12,751	106	13,077	6	3,709

	31 March 2019	31 March 2016
Average age	60.7	57.8
Average age at retirement	46.7	45.2

Table 91 Regular Force - Male Other Ranks - Retirement Pensioners
Number and Average Annual Pension as at 31 March 2019

	Immediate Annuity (includes PBDA,CPP if applicable) [1]				Deferred annuity			
	SA/CFPF		RCA		SA/CFPF		RCA	
Age	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)
20-24	-	-	-	-	86	2,782	-	-
25-29	-	-	-	-	247	4,032	-	-
30-34	11	12,773	-	-	475	5,176	-	-
35-39	33	21,240	-	-	353	7,057	-	-
40-44	271	29,564	1	-	174	9,414	-	-
45-49	1,551	30,779	6	4,427	90	11,042	-	-
50-54	3,885	30,061	5	2,310	72	10,640	-	-
55-59	7,830	28,067	1	-	98	10,901	-	-
60-64	6,992	30,766	-	-	-	-	-	-
65-69	4,872	24,936	-	-	-	-	-	-
70-74	5,506	25,571	-	-	-	-	-	-
75-79	5,406	24,865	-	-	-	-	-	-
80-84	5,130	24,210	-	-	-	-	-	-
85-89	2,984	23,590	-	-	-	-	-	-
90-94	910	23,569	-	-	-	-	-	-
95-99	201	23,263	-	-	-	-	-	-
100-104	11	-	-	-	-	-	-	-
105+	1	-	-	-	-	-	-	-
All Ages	45,594	26,889	13	3,369	1,595	6,678	-	-

	31 March 2019	31 March 2016
Average age	68.3	66.0
Average age at retirement	45.2	44.5

[1] Includes annual allowance adjustments, PBDA reductions and CPP coordination if in effect at the valuation date.

Table 92 Regular Force - Female Other Ranks - Retirement Pensioners
Number and Average Annual Pension as at 31 March 2019

	Immediate Annuity (includes PBDA,CPP if applicable) [1]				Deferred annuity			
	SA/CFPF		RCA		SA/CFPF		RCA	
Age	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)
20-24	-	-	-	-	6	2,228	-	-
25-29	-	-	-	-	12	5,310	-	-
30-34	2	-	-	-	41	6,894	-	-
35-39	4	21,961	-	-	50	8,449	-	-
40-44	22	27,760	-	-	40	8,500	-	-
45-49	174	29,904	1	-	38	13,490	-	-
50-54	476	27,208	4	2,620	28	8,679	-	-
55-59	1,097	23,838	2	-	36	9,944	-	-
60-64	976	26,248	-	-	-	-	-	-
65-69	378	22,419	-	-	-	-	-	-
70-74	160	22,500	-	-	-	-	-	-
75-79	70	21,792	-	-	-	-	-	-
80-84	35	19,723	-	-	-	-	-	-
85-89	14	18,861	-	-	-	-	-	-
90-94	4	12,173	-	-	-	-	-	-
95-99	1	-	-	-	-	-	-	-
All Ages	3,413	24,984	7	2,494	251	8,908	-	-

	31 March 2019	31 March 2016
Average age	60.2	56.4
Average age at retirement	43.7	42.5

Table 93 Regular Force - Male Officers - 3B Pensioners
Number and Average Annual Pension as at 31 March 2019

	Immediate Annuity (includes PBDA,CPP if applicable) [1]				Deferred annuity			
	SA/CFPF		RCA		SA/CFPF		RCA	
Age	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)
20-24	-	-	-	-	4	1,540	-	-
25-29	3	16,307	-	-	6	5,111	-	-
30-34	22	17,581	-	-	10	3,440	-	-
35-39	67	24,178	-	-	5	6,347	-	-
40-44	119	32,118	7	6,692	3	6,811	-	-
45-49	216	42,311	12	16,628	7	14,132	-	-
50-54	309	53,164	22	10,753	1	-	-	-
55-59	601	56,518	43	8,347	3	-	-	-
60-64	452	59,236	35	9,307	-	-	-	-
65-69	223	50,377	7	19,604	-	-	-	-
70-74	125	49,463	6	-	-	-	-	-
75-79	53	45,396	1	-	-	-	-	-
80-84	19	39,271	-	-	-	-	-	-
85-89	7	29,771	-	-	-	-	-	-
90-94	2	39,536	-	-	-	-	-	-
All Ages	2,218	50,966	133	10,057	39	7,844	-	-

	31 March 2019	31 March 2016
Average age	57.8	56.5
Average age at retirement	48.6	47.5

Table 94 Regular Force - Female Officers - 3B Pensioners
Number and Average Annual Pension as at 31 March 2019

	Immediate Annuity (includes PBDA,CPP if applicable) [1]				Deferred annuity			
	SA/CFPF		RCA		SA/CFPF		RCA	
Age	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)
25-29	-	-	-	-	3	3,808	-	-
30-34	11	18,362	-	-	4	3,402	-	-
35-39	42	23,761	-	-	2	10,206	-	-
40-44	68	32,329	5	7,836	1	-	-	-
45-49	94	38,100	8	8,899	1	-	-	-
50-54	108	46,750	9	20,759	-	-	-	-
55-59	129	53,152	19	9,818	2	5,903	1	-
60-64	88	51,833	8	8,454	-	-	-	-
65-69	38	41,833	2	-	-	-	-	-
70-74	18	39,154	1	-	-	-	-	-
All Ages	596	43,190	52	11,433	13	5,180	1	-

	31 March 2019	31 March 2016
Average age	53.2	52.0
Average age at retirement	45.8	44.6

[1] Includes annual allowance adjustments, PBDA reductions and CPP coordination if in effect at the valuation date.

Table 95 Regular Force - Male Other Ranks - 3B Pensioners
Number and Average Annual Pension as at 31 March 2019

	Immediate Annuity (includes PBDA,CPP if applicable) [1]				Deferred annuity			
	SA/CFPF		RCA		SA/CFPF		RCA	
Age	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)
20-24	-	-	-	-	10	3,630	-	-
25-29	24	12,399	-	-	24	4,505	-	-
30-34	390	14,329	-	-	83	6,155	-	-
35-39	921	17,095	-	-	55	6,265	-	-
40-44	1,286	20,925	-	-	24	6,461	-	-
45-49	2,319	25,637	-	-	14	8,441	-	-
50-54	3,634	28,824	1	-	12	8,958	-	-
55-59	4,353	31,650	1	-	11	6,734	-	-
60-64	2,076	32,830	-	-	-	-	-	-
65-69	878	26,062	-	-	-	-	-	-
70-74	568	23,057	-	-	-	-	-	-
75-79	410	19,786	-	-	-	-	-	-
80-84	293	17,253	-	-	-	-	-	-
85-89	186	15,868	-	-	-	-	-	-
90-94	39	17,478	-	-	-	-	-	-
95-99	7	-	-	-	-	-	-	-
100-104	1	-	-	-	-	-	-	-
All Ages	17,385	27,125	2	-	233	6,243	-	-

	31 March 2019	31 March 2016
Average age	55.2	54.6
Average age at retirement	43.2	42.4

[1] Includes annual allowance adjustments, PBDA reductions and CPP coordination if in effect at the valuation date.

Table 96 Regular Force - Female Other Ranks - 3B Pensioners
Number and Average Annual Pension as at 31 March 2019

	Immediate Annuity (includes PBDA,CPP if applicable) [1]				Deferred annuity			
	SA/CFPF		RCA		SA/CFPF		RCA	
Age	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)
25-29	4	12,571	-	-	12	4,446	-	-
30-34	63	13,818	-	-	16	5,124	-	-
35-39	177	16,588	-	-	14	6,023	-	-
40-44	250	18,583	-	-	14	5,713	-	-
45-49	579	23,718	-	-	9	6,250	-	-
50-54	807	27,105	-	-	8	7,769	-	-
55-59	913	28,059	-	-	19	5,958	-	-
60-64	463	28,427	-	-	-	-	-	-
65-69	109	21,370	-	-	-	-	-	-
70-74	23	23,429	-	-	-	-	-	-
75-79	1	-	-	-	-	-	-	-
80-84	2	22,427	-	-	-	-	-	-
85-89	1	-	-	-	-	-	-	-
All Ages	3,392	25,303	-	-	92	5,774	-	-

	31 March 2019	31 March 2016
Average age	53.1	51.1
Average age at retirement	43.8	42.6

Table 97 Regular Force - Male Officers - 3A Pensioners
Number and Average Annual Pension as at 31 March 2019

	Immediate Annuity (includes PBDA,CPP if applicable) [1]				Deferred annuity			
	SA/CFPF		RCA		SA/CFPF		RCA	
Age	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)
50-54	2	28,973	-	-	-	-	-	-
55-59	3	15,894	-	-	-	-	-	-
60-64	7	32,538	1	-	-	-	-	-
65-69	4	19,206	-	-	-	-	-	-
70-74	7	24,876	-	-	-	-	-	-
75-79	6	28,407	-	-	-	-	-	-
80-84	5	12,984	-	-	-	-	-	-
85-89	3	25,794	-	-	-	-	-	-
90-94	8	27,694	-	-	-	-	-	-
All Ages	45	24,859	1	-	-	-	-	-

	31 March 2019	31 March 2016
Average age	75.3	78.8
Average age at retirement	40.0	38.0

[1] Includes annual allowance adjustments, PBDA reductions and CPP coordination if in effect at the valuation date.

Table 98 Regular Force - Female Officers - 3A Pensioners
Number and Average Annual Pension as at 31 March 2019

	Immediate Annuity (includes PBDA,CPP if applicable) [1]				Deferred annuity			
	SA/CFPF		RCA		SA/CFPF		RCA	
Age	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)
55-59	1	-	-	-	-	-	-	-
60-64	2	26,055	-	-	-	-	-	-
65-69	4	24,015	-	-	-	-	-	-
70-74	5	25,247	-	-	-	-	-	-
75-79	-	-	-	-	-	-	-	-
80-84	-	-	-	-	-	-	-	-
85-89	-	-	-	-	-	-	-	-
90-94	1	-	-	-	-	-	-	-
All Ages	13	23,017	-	-	-	-	-	-

	31 March 2019	31 March 2016
Average age	70.0	73.1
Average age at retirement	43.4	41.5

Table 99 Regular Force - Male Other Ranks - 3A Pensioners
Number and Average Annual Pension as at 31 March 2019

	Immediate Annuity (includes PBDA,CPP if applicable) [1]				Deferred annuity			
	SA/CFPF		RCA		SA/CFPF		RCA	
Age	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)
30-34	1	-	-	-	-	-	-	-
35-39	-	-	-	-	-	-	-	-
40-44	1	-	-	-	-	-	-	-
45-49	6	21,948	-	-	-	-	-	-
50-54	19	13,682	-	-	-	-	-	-
55-59	56	16,063	-	-	-	-	-	-
60-64	49	18,399	-	-	-	-	-	-
65-69	27	19,715	-	-	-	-	-	-
70-74	29	16,773	-	-	-	-	-	-
75-79	39	14,020	-	-	-	-	-	-
80-84	59	12,702	-	-	-	-	-	-
85-89	72	12,154	-	-	-	-	-	-
90-94	19	18,553	-	-	-	-	-	-
95-99	3	12,769	-	-	-	-	-	-
All Ages	380	15,257	-	-	-	-	-	-

	31 March 2019	31 March 2016
Average age	73.1	77.9
Average age at retirement	37.7	37.0

[1] Includes annual allowance adjustments, PBDA reductions and CPP coordination if in effect at the valuation date.

Table 100 Regular Force - Female Other Ranks - 3A Pensioners
Number and Average Annual Pension as at 31 March 2019

	Immediate Annuity (includes PBDA,CPP if applicable) [1]				Deferred annuity			
	SA/CFPF		RCA		SA/CFPF		RCA	
Age	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)	Number	Pension ($)
40-44	1	-	-	-	-	-	-	-
45-49	3	16,504	-	-	-	-	-	-
50-54	9	11,523	-	-	-	-	-	-
55-59	22	14,997	-	-	-	-	-	-
60-64	12	16,440	-	-	-	-	-	-
65-69	8	19,815	-	-	-	-	-	-
70-74	1	-	-	-	-	-	-	-
All Ages	56	15,645	-	-	-	-	-	-

	31 March 2019	31 March 2016
Average age	58.6	57.3
Average age at retirement	38.9	39.1

Table 101 Reserve Force - Male Officers - Retirement Pensioners
Number and Average Annual Pension as at 31 March 2019

	Immediate Annuity		Deferred Annuity	
Age	Number	Pension ($)	Number	Pension ($)
20-24	-	-	5	-
25-29	-	-	108	574
30-34	-	-	198	888
35-39	-	-	218	1,264
40-44	-	-	155	1,497
45-49	1	-	150	1,981
50-54	15	5,846	148	2,404
55-59	66	12,344	165	2,756
60-64	326	6,120	1	-
65-69	386	3,441	-	-
70-74	191	3,259	-	-
75+	12	-	-	-
All Ages	997	4,919	1,148	1,617

	31 March 2019	31 March 2016	31 March 2019	31 March 2016
Average age	65.9	64.4	42.6	42.3
Average age at retirement	60.3	60.8	37.8	39.4

Table 102 Reserve Force - Female Officers - Retirement Pensioners
Number and Average Annual Pension as at 31 March 2019

	Immediate Annuity		Deferred Annuity	
Age	Number	Pension ($)	Number	Pension ($)
20-24	-	-	1	244
25-29	-	-	61	464
30-34	-	-	142	787
35-39	-	-	153	912
40-44	-	-	64	1,026
45-49	-	-	70	2,071
50-54	3	3,690	63	2,141
55-59	23	4,040	49	1,302
60-64	84	4,622	-	-
65-69	94	3,098	-	-
70-74	48	2,904	-	-
75+	3	4,013	-	-
All Ages	255	3,666	603	1,143
	31 March 2019	31 March 2016	31 March 2019	31 March 2016
Average age	65.6	64.0	40.2	38.8
Average age at retirement	60.3	60.8	35.4	35.7

Table 103 Reserve Force - Male Other Ranks - Retirement Pensioners
Number and Average Annual Pension as at 31 March 2019

	Immediate Annuity		Deferred Annuity	
Age	Number	Pension ($)	Number	Pension ($)
20-24	-	-	162	451
25-29	-	-	1,344	745
30-34	-	-	1,448	1,194
35-39	-	-	666	1,419
40-44	-	-	323	1,633
45-49	-	-	212	2,076
50-54	8	-	129	2,353
55-59	55	6,491	104	2,181
60-64	202	4,202	-	-
65-69	84	3,875	-	-
70-74	9	1,856	-	-
75+	1	-	-	-
All Ages	359	4,377	4,388	1,196
	31 March 2019	31 March 2016	31 March 2019	31 March 2016
Average age	62.8	61.5	34.0	32.1
Average age at retirement	57.9	58.3	29.2	29.3

Table 104 Reserve Force - Female Other Ranks - Retirement Pensioners
Number and Average Annual Pension as at 31 March 2019

	Immediate Annuity		Deferred Annuity	
Age	Number	Pension ($)	Number	Pension ($)
20-24	-	-	16	307
25-29	-	-	167	831
30-34	-	-	288	1,274
35-39	-	-	155	1,484
40-44	-	-	73	1,475
45-49	-	-	49	2,268
50-54	4	-	30	2,356
55-59	18	15,352	20	5,229
60-64	38	4,701	-	-
65-69	15	5,621	-	-
70-74	1	-	-	-
75+	-	-	-	-
All Ages	76	7,654	798	1,422
	31 March 2019	31 March 2016	31 March 2019	31 March 2016
Average age	61.6	59.3	35.4	33.9
Average age at retirement	56.2	55.9	30.2	30.9

Table 105 Reserve Force - Officers - Disability Pensioners
Number and Average Annual Pension as at 31 March 2019

	Male Officer		Female Officer	
Age	Number	Pension ($)	Number	Pension ($)
30-34	1	-	1	-
35-39	5	1,292	-	-
40-44	2	3,836	-	-
45-49	6	8,662	-	-
50-54	11	6,801	2	-
55-59	7	9,930	2	9,224
60-64	22	9,650	2	13,432
65-69	12	8,568	-	-
70-74	1	-	-	-
All Ages	67	7,995	7	9,102
	31 March 2019	31 March 2016	31 March 2019	31 March 2016
Average age	57.3	60.1	54.0	N/A
Average age at retirement	52.1	56.3	50.1	N/A

Table 106 Reserve Force - Other Ranks - Disability Pensioners
Number and Average Annual Pension as at 31 March 2019

	Male Other Rank		Female Other Rank	
Age	Number	Pension ($)	Number	Pension ($)
20-24	2	494	-	-
25-29	19	2,180	3	1,702
30-34	24	2,693	5	1,051
35-39	21	3,492	5	2,253
40-44	10	4,260	6	2,788
45-49	21	3,567	9	10,628
50-54	16	6,315	8	9,471
55-59	20	8,550	16	11,831
60-64	24	5,317	14	6,050
65-69	8	6,265	3	8,556
70-74	-	-	-	-
All Ages	165	4,531	69	7,383
	31 March 2019	31 March 2016	31 March 2019	31 March 2016
Average age	46.2	54.6	51.4	53.9
Average age at retirement	41.4	49.6	45.7	48.8

Table 107 Regular Force - Surviving Spouses
Number and Average Annual Pension as at 31 March 2019

	Number			RCA			
				Spouse Allowance for Service since 1992		Maximum Earnings Limit for service since 1995	
Age	Widower	Widow	Allowance ($)	Number	Allowance ($)	Number	Pension ($)
25-29	-	11	5,275	-	-	-	-
30-34	4	46	5,359	-	-	-	-
35-39	3	67	6,970	5	1,704	-	-
40-44	1	103	10,714	9	193	-	-
45-49	9	173	13,243	20	48	-	-
50-54	17	365	13,857	53	143	-	-
55-59	49	678	13,740	127	439	-	-
60-64	40	965	14,409	102	138	-	-
65-69	29	1,358	15,236	82	265	-	-
70-74	36	2,346	15,279	38	235	-	-
75-79	41	3,498	14,811	11	32	-	-
80-84	47	4,321	14,424	3	54	-	-
85-89	51	3,891	13,849	-	-	-	-
90-94	42	2,450	13,970	-	-	-	-
95-99	21	967	13,779	-	-	-	-
100-104	-	85	12,815	-	-	-	-
105+	-	6	13,528	-	-	-	-
All Ages	390	21,330	14,329	450	266	-	-

	31 March 2019	31 March 2016
Male average age	74.3	65.3
Female average age	79.5	79.0
Male average age at death of member	61.7	56.4
Female average age at death of member	64.2	64.6
Total annual allowances payable - $ millions	323.7	307.1

Table 108 Reserve Force - Surviving Spouses
Number and Average Annual Allowance as at 31 March 2019

	Widow		Widower	
Age	Number	Allowance ($)	Number	Allowance ($)
To 29	1	-	-	-
30-34	2	879	-	-
35-39	5	1,885	-	-
40-44	11	1,582	1	-
45-49	4	4,778	2	778
50-54	10	2,525	1	-
55-59	28	2,378	1	-
60-64	13	1,572	3	2,133
65-69	12	1,633	3	4,281
70-74	8	855	1	-
75+	4	-	2	894
All Ages	98	1,985	14	1,973
	31 March 2019	31 March 2016	31 March 2019	31 March 2016
Average age	56.7	50.8	62.6	54.6
Average age at death of member	52.9	47.9	58.9	52.2

Appendix L — Acknowledgements

Superannuation Directorate of the Department of Public Services and Procurement Canada provided all the relevant valuation input data on active members, pensioners and survivors.

The co-operation and able assistance received from the above-mentioned data providers deserve to be acknowledged.

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