Dalhousie University
Staff Pension Plan

Report on the Actuarial Valuation
As at March 31, 2017

(Registration No. C242297)

November 2017

Prepared by:

Eckler

CONSULTANTS + ACTUARIES

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Going concern value of assets	$1,242,753
Going concern actuarial liabilities	(1,267,959)
Going concern excess / (unfunded actuarial liabilities)	($25,206)

Solvency Financial Position	March 31, 2017
Solvency assets	$1,241,803
Solvency liabilities	(1,520,081)
Solvency excess / (deficit)	($278,278)
Present value of special payments	$15,831
Solvency excess / (deficiency)	($262,447)
Transfer ratio	81.8%

Wind-up Financial Position	March 31, 2017
Wind-up assets	$1,241,803
Total wind-up liabilities	(1,520,081)
Wind-up surplus / (deficiency)	($278,278)

Funding Requirements (annualized)	March 31, 2017 % of Payroll	 $
Estimated pensionable earnings		252,059
Total annual current service cost	17.39%	43,821
Employee regular contributions	6.06%	15,275
Employee supplementary contributions	2.00%	5,041
Employer matching regular contributions	6.06%	15,275
Balance of cost = employer “overmatching contribution”	3.27%	8,230
Employer contributions as a percentage of employee contributions	115.7%	
Minimum special payments in 2017/18 towards amortization of unfunded actuarial liabilities		$3,398
Total employer contributions in year following valuation		$26,903
Maximum contribution		$301,783

SECTION I INTRODUCTION AND PURPOSE OF VALUATION

At the request of Dalhousie University, we have completed an actuarial valuation of the *Dalhousie University Staff Pension Plan* (the "Plan") as of March 31, 2017. The last actuarial valuation was performed as at March 31, 2014.

The purposes of this actuarial valuation are as follows:

- to determine the financial position of the Plan on going concern, solvency, and hypothetical wind-up bases;
- to establish the minimum and maximum contributions to the Plan until the next valuation; and
- to meet the statutory filing requirements under the Nova Scotia *Pension Benefits Act* and the *Income Tax Act* (Canada).

In this report, we have first provided the valuation results, along with an actuarial opinion with recommended funding levels for use until the next valuation. The data, actuarial assumptions and methodology used in valuing both the assets and the actuarial liabilities are provided by way of appendices for ease of reference.

The intended users of this report are Dalhousie University, the Nova Scotia Superintendent of Pensions and the Canada Revenue Agency. This report is not intended or necessarily suitable for purposes other than those listed above. Any party reviewing this report for other purposes should have their own actuary or other qualified professional assist in their review to ensure that the party understands the assumptions, results and uncertainties inherent in our estimates.

The next valuation of the Plan must be completed as at a date no later than March 31, 2018.

Reliance

We have relied on the asset information in the financial statements provided by Dalhousie University. We have also relied on the Plan sponsor to provide all relevant data and to confirm the pertinent Plan terms.

SECTION II PLAN CHANGES AND SUBSEQUENT EVENTS

This pension plan is a “best average salary” defined benefit plan. This means that each Member’s retirement pension is calculated as a specified percentage (2% in this case) of his or her average salary during the best three years of membership in the Plan.

The previous valuation was prepared as at March 31, 2014. Effective June 1, 2015, the Plan has been administered in accordance with the changes to the Nova Scotia *Pension Benefits Act* and an amendment has been filed to bring the Plan document into compliance. These changes include a change to the pre-retirement death benefit, which impacts the funding of the Plan. The minimum pre-retirement death benefit for post-1987 pensionable service has been changed from a 60% commuted value entitlement to a 100% commuted value entitlement effective June 1, 2015.

Effective August 1, 2016, the Plan was also amended to change the formula for interest crediting from a fund rate of return type crediting rate, to a crediting rate tied to the average of the yields of 5-year personal fixed term chartered bank deposit rates (i.e., the same rate as is being credited on Member Supplementary Contributions).

The above plan changes result in a net decrease in liabilities of $2,151,000 as at March 31, 2017.

The amendments as described above have been reflected in this report where applicable. We have not described all the changes that are in the amendment to comply with the new Nova Scotia *Pension Benefits Act*, as they have no material impact on the results of this valuation.

A more detailed description of the current provisions of the Plan is contained in Appendix D, at the end of this report.

Actuarial Assumptions

There have been no changes to the going concern assumptions since the last valuation.

The solvency assumptions have been changed to reflect market conditions at the valuation date and the mortality assumption has been updated in accordance with actuarial standards.

The actuarial assumptions used in the valuation are provided in Appendix B.

We are not aware of any events subsequent to the valuation date that would have a material impact on the results of this valuation.

SECTION III FINANCIAL POSITION OF THE PLAN

A. Going Concern Basis: Financial Position as at March 31, 2017

The tables below set out the going concern valuation balance sheet as of March 31, 2017 for the Pension Trust Fund (PTF), the Retirees Trust Fund (RTF), and the Plan as a whole, respectively. The results as at March 31, 2014 are also shown for comparative purposes.

PENSION TRUST FUND - GOING CONCERN ACTUARIAL BALANCE SHEET
(ALL FIGURES IN $000'S)

	March 31, 2014	March 31, 2017
Going concern assets		
Market value of assets	$593,454	$704,691
Financial statement (payables) / receivables	(2,292)	(6,992)
Total going concern assets	$591,162	$697,699
Going concern actuarial liabilities		
Active members	$652,339	$701,300
Additional voluntary contributions	375	373
Pending transfers	33,122	45,914
Termination solvency holdbacks	6,080	978
Total going concern actuarial liabilities	$691,916	$748,565
Going concern excess / (unfunded actuarial liability)	**($100,754)**	**($50,866)**

RETIREES TRUST FUND - GOING CONCERN ACTUARIAL BALANCE SHEET
(ALL FIGURES IN $000'S)

	March 31, 2014	March 31, 2017
Going concern assets		
Market value of assets	$413,535	$541,550
Financial statement (payables) / receivables	(878)	3,504
Total going concern assets	$412,657	$545,054
Going concern actuarial liabilities		
Pensioners and beneficiaries	$366,561	$503,880
Deferred members	13,621	15,514
Total going concern actuarial liabilities	$380,182	$519,394
Going concern excess / (unfunded actuarial liability)	**$32,475**	**$25,660**

TOTAL PLAN - GOING CONCERN ACTUARIAL BALANCE SHEET
(ALL FIGURES IN $000'S)

	March 31, 2014	March 31, 2017
Going concern assets		
Market value of PTF assets*	$591,162	$697,699
Market value of RTF assets*	412,657	545,054
Total going concern assets	$1,003,819	$1,242,753
Going concern actuarial liabilities		
PTF actuarial liabilities	$691,916	$748,565
RTF actuarial liabilities	380,182	519,394
Total going concern actuarial liabilities	$1,072,098	$1,267,959
Going concern excess / (unfunded actuarial liability)	**($68,279)**	**($25,206)**

* Net of (Payables)/Receivables

As shown above, the March 31, 2017 actuarial valuation has revealed an unfunded actuarial liability in the amount of $25,206,000. This compares to a going concern unfunded actuarial liability at the previous valuation of $68,279,000. Funding requirements in respect of the unfunded actuarial liability are detailed in Section IV – Funding Requirements.

Sensitivity Analysis

Below we show the impact on the going concern actuarial liability as at March 31, 2017 of a one percentage point drop in the discount rate assumption (i.e., from 6.00% per annum to 5.00% per annum in the pre-retirement period, and from 4.55% per annum to 3.55% per annum in the post-retirement period). All other assumptions were kept unchanged.

GOING CONCERN SENSITIVITY (FIGURES IN $000'S)

	Impact of 1% Drop
Total Going Concern Actuarial Liability	$1,451,398,000

A 1% decline in the discount rate would increase the going concern actuarial liability by $183,439,000 or 14.5%. There would be a corresponding dollar increase in the unfunded liability.

Reconciliation of Going Concern Financial Position

The reconciliation provides an independent cross-check of the calculations performed, and also determines the chief reasons leading to the changes in the going concern financial position that have occurred since the previous valuation date.

Although a complete analysis down to the final dollar can be made, such an analysis requires the processing of a considerable amount of detailed data relating to the Plan, the expense of which would not normally be justified unless there were special circumstances. However, it is possible to make an approximate analysis along broader lines and under normal circumstances, this type of analysis will produce meaningful results.

The table below summarizes the results of our reconciliation of change in financial position over the period under consideration.

ANALYSIS OF SOURCES OF GAIN AND LOSS BETWEEN MARCH 31, 2014 AND MARCH 31, 2017 (GOING CONCERN VALUATION)

	PTF	RTF	Total
Going concern excess / (unfunded liability) at March 31, 2014	(100,754)	32,475	(68,279)
Interest on market value surplus / (deficit)	(19,246)	4,670	(14,576)
Investment income greater / (less) than expected	33,591	26,444	60,035
Special payments plus interest	25,463	0	25,463
Change in maximum pension less than expected	4,200	0	4,200
Cost of indexing	0	(28,655)	(28,655)
Pensioner mortality experience	0	(4,197)	(4,197)
Salary increases (greater) / less than expected	(209)	0	(209)
Current service cost shortfall due to increase in average age	(1,798)	0	(1,798)
Retirement and termination experience	3,397	0	3,397
Plan changes	2,151	0	2,151
Change to mortality assumption on transfers and deferred retirements	2,798	(2,798)	0
Impact of unisex/married assumption on inter-valuation retiree transfers	1,708	(1,708)	0
Miscellaneous experience gains / (losses)[1]	(2,168)	(571)	(2,738)
Going concern excess / (unfunded liability) at March 31, 2017	**(50,866)**	**25,660**	**(25,206)**

[1] Miscellaneous experience includes all items not specifically traced, and imprecision imposed by valuation and measurement methodologies in some of the items that are traced. Included will be experience gains and losses associated with data refinements, and with the interplay among assumptions in dealing with actual versus expected results.

B. Solvency Basis: Financial Position as at March 31, 2017

The tables below set out the solvency valuation balance sheet as of March 31, 2017 for the Pension Trust Fund (PTF), the Retirees Trust Fund (RTF), and the Plan as a whole, respectively. The results as at March 31, 2014 are also shown for comparative purposes.

PENSION TRUST FUND – SOLVENCY BALANCE SHEET
(ALL FIGURES IN $000'S)

	March 31, 2014	March 31, 2017
Solvency assets		
Market value of assets	$593,454	$704,691
Financial statement (payables) / receivables	(2,292)	(6,992)
Estimated wind-up expenses	(750)	(950)
Total solvency assets	$590,412	$696,749
Solvency liabilities		
Active members	$730,734	$886,241
Additional voluntary contributions	375	373
Pending transfers	33,122	45,914
Termination solvency holdbacks	6,080	978
Total solvency liabilities	$770,311	$933,506
Solvency excess / (deficit)	**($179,899)**	**($236,757)**

RETIREES TRUST FUND – SOLVENCY BALANCE SHEET
(ALL FIGURES IN $000'S)

	March 31, 2014	March 31, 2017
Solvency assets		
Market value of assets	$413,535	$541,550
Financial statement (payables) / receivables	(878)	3,504
Total solvency assets	$412,657	$545,054
Solvency liabilities		
Pensioners and beneficiaries	$372,306	$570,034
Deferred members	14,279	16,541
Total solvency liabilities	$386,585	$586,575
Solvency excess / (deficit)	**$26,072**	**($41,521)**

TOTAL PLAN – SOLVENCY BALANCE SHEET
(ALL FIGURES IN $000'S)

	March 31, 2014	March 31, 2017
Solvency assets		
Market value of PTF assets*	$591,162	$697,699
Estimated wind-up expenses	(750)	(950)
Market value of RTF assets*	412,657	545,054
Total solvency assets	$1,003,069	$1,241,803
Solvency liabilities		
PTF solvency liabilities	$770,311	$933,506
RTF solvency liabilities	386,585	586,575
Total solvency liabilities	$1,156,896	$1,520,081
Solvency excess / (deficit) excluding present value of special payments	**($153,827)**	**($278,278)**
Present value of 5 years' worth of unfunded liability special payments (i.e., the solvency asset adjustment)	39,650	15,831
Solvency excess / (deficiency)	**($114,177)**	**($262,447)**

* Net of (payables) / receivables

As shown above, the solvency valuation has revealed a solvency deficit of $278,278,000, prior to the inclusion of the present value of any special payments as at March 31, 2017. With the inclusion of 5 years' worth of special payments, there is a solvency deficiency of $262,447,000.

Sensitivity Analysis

Below we show the impact on the solvency liability as at March 31, 2017 of a one percentage point drop in the discount rate assumption. All other assumptions were kept unchanged.

SOLVENCY SENSITIVITY (FIGURES IN $000'S)

	Impact of 1% Drop
Total Solvency Actuarial Liability	$1,730,122,000

A 1% decline in the solvency discount rate would increase the solvency liability by $210,041,000 or 13.8%. There would be a corresponding dollar increase in the solvency deficit.

Incremental Cost

The incremental cost is the present value, at the valuation date, of the expected aggregate change in the hypothetical wind-up or solvency liability between the valuation date and the next valuation date. It also reflects expected benefit payments between the valuation date and the next calculation date.

In our report, we have determined the incremental cost on a solvency basis. The incremental cost was determined as the sum of (a) and (b) minus (c):

(a) the projected solvency liability at the next valuation date for those members at the current valuation date, allowing for expected decrements, change in membership status and service accrual between the current valuation date and the next valuation date. No adjustment was made for new entrants between the two valuation dates. The resulting projected solvency liability was then discounted to the current valuation date;

(b) the present value of the benefit payments expected to be paid between current valuation date and the next valuation date, discounted to the current valuation date; and

(c) the solvency liability as at the current valuation date.

For purposes of calculating the solvency incremental cost, the expected decrements, as well as the expected benefit payments between the current valuation date and the next valuation date, were determined assuming members retire at age 65 for simplicity. The projected solvency liability at the next valuation date was determined using the same methods and assumptions as disclosed in Appendix B of this report. In particular, we have assumed that the discount rates will remain the same throughout the projection period and the Standards of Practice for determining Pension Commuted Values in effect at the valuation date will remain unchanged, as will the current educational guidance on the estimation of annuity purchase costs.

The estimated incremental cost from March 31, 2017 to March 31, 2018 is $74,359,000. The estimated incremental cost does not impact the funding requirements of the Plan under the Nova Scotia *Pension Benefits Act* and is for information purposes only.

C. Transfer Ratio as at March 31, 2017

The Regulations under the Nova Scotia *Pension Benefits Act* require the determination of a "transfer ratio". This transfer ratio is used to determine whether transfers of commuted values to terminating members can be made in full, immediately. The transfer ratio is the ratio of:

(i) the solvency assets (at market value), minus the lesser of the previous year credit balance and the sum of the minimum employer contributions required under the Regulations until the next valuation date ($1,242,753,000 – $0), to

(ii) the sum of the solvency liabilities and the liabilities for benefits that were excluded in calculating the solvency liabilities (note that there were no such benefits excluded for the solvency valuation).

As at March 31, 2017 the transfer ratio was 81.8% (i.e., $1,242,753,000 divided by $1,520,081,000).

If the transfer ratio is less than 100% then, unless certain conditions are met, a portion of a terminated member's commuted value cannot be paid in a lump sum, but instead must be held back and paid with interest within 5 years. For this plan, the portion is 18.2%. The conditions that allow full payment of the commuted value are:

- if an additional contribution is remitted to the fund equal to the portion of the commuted value that should be held back; or
- if the aggregate of transfer deficiencies for all transfers made since the last review date does not exceed 5% of the assets of the plan at that time.

Next Valuation Date

A valuation indicates "solvency concerns" if the ratio of solvency assets to solvency liabilities is less than 0.85. If a pension plan has solvency concerns, the next valuation of the plan must be prepared with an effective date no later than one year (versus the normal three years) after the effective date of the current valuation. As at March 31, 2017, the ratio of solvency assets to solvency liabilities is 0.818 (i.e., $1,242,753,000 divided by $1,520,081,000). Therefore, the next valuation of the Plan must be at a date no later than March 31, 2018.

D. Hypothetical Wind-up Basis: Financial Position as at March 31, 2017

The financial position of the Plan on a wind-up basis as of March 31, 2017 is as follows:

TOTAL PLAN – WIND-UP BALANCE SHEET
(ALL FIGURES IN $000'S)

	March 31, 2014	March 31, 2017
Wind-up assets		
Market value of PTF assets*	$591,162	$697,699
Estimated wind-up expenses	(750)	(950)
Market value of RTF assets*	412,657	545,054
Total wind-up assets	$1,003,069	$1,241,803
Wind-up liabilities		
PTF wind-up liabilities	$770,311	$933,506
RTF wind-up liabilities	386,585	586,575
Total wind-up liabilities	$1,156,896	$1,520,081
Wind-up excess / (deficiency)	**($153,827)**	**($278,278)**

* Net of (payables) / receivables

As shown above, on a wind-up basis there is a deficiency of $278,278,000 in the Plan after providing for settlement of all accrued benefit entitlements as at March 31, 2017.

SECTION IV FUNDING REQUIREMENTS

A. Current Service Costs

The Plan's current service cost (also referred to as the "normal cost") is the value of the benefits accruing to members in the year following the valuation, determined on a going concern basis.

The table below summarizes the results of the Plan's current service cost for the 12-month period following March 31, 2017.

CURRENT SERVICE COST

	% of Payroll	($000's)
Estimated pensionable earnings		252,059
Total annual current service cost	17.39%	43,821
Employee regular contributions	6.06%	15,275
Employee supplementary contributions	2.00%	5,041
Employer matching regular contributions	6.06%	15,275
Balance of cost = employer "overmatching contribution"	3.27%	8,230
Employer contributions as a percentage of employee contributions	115.70%	

The cost of benefits accruing in respect of the year following the valuation date is $43,821,000. This amounts to 17.39% of active contributory payroll. The employee required and employer matching contributions in the year amount to $15,275,000 (i.e., 6.06% of contributory payroll) each. Employees are also required to contribute supplementary contributions in the amount of $5,041,000 (i.e., 2.00% of contributory payroll). The balance remaining (i.e., $8,230,000 or 3.27% of payroll) represents employer "overmatching contributions". Total employer contributions (i.e., 15,275,000 + 8,230,000 = 23,505,000, or 6.06% + 3.27% = 9.33% of payroll) amount to 115.7% of employee contributions.

The total current service cost has increased from 17.20% of payroll to 17.39% of payroll, as a result of the net impact of demographic changes and changes to plan provisions. The following sets out an approximate reconciliation of the change in the total current service cost as a percentage of payroll:

CURRENT SERVICE COST RECONCILIATION

	% of Payroll
Total current service cost as at the previous valuation	17.20%
Plan changes (interest crediting)	(0.28%)
Plan changes (pre-retirement death benefits)	0.21%
Demographic changes (i.e., aging)	0.26%
Total current service cost as at the current valuation	17.39%

Sensitivity Analysis

Below we show the impact on the 2017/18 current service cost as at March 31, 2017 of a one percentage point drop in the discount rate assumption. All other assumptions were kept unchanged.

CURRENT SERVICE COST SENSITIVITY

	Impact 1% Drop
Total Current Service Cost	$53,666,000

The change in the discount rate would have the impact of increasing the current service cost by $9,845,000 or 22.5% as at March 31, 2017. With employee regular and supplementary contributions remaining at a total 8.06% of pay, the employer contribution requirement (i.e., matching and overmatching) would rise to 13.23% of pay (i.e., a total cost of 21.29% of pay).

B. Special Payments

In addition to current service contributions, special payments are required in order to amortize the Plan's going concern unfunded liability, as identified in Section III.

The following table summarizes the previously established going concern special payments:

REMAINING ANNUAL SPECIAL PAYMENTS FROM PREVIOUS VALUATION AS AT MARCH 31, 2014

Payment Type	Date Established	Term Remaining	Payment in the year following the valuation ($000's)	Special Payment (% of Payroll)	Present Value of Remaining Payments[1] ($000's)
Going Concern	March 31, 2010	8 years	6,982	2.77%	50,044
Going Concern	March 31, 2013	11 years	1,689	0.67%	16,089
Total			**$8,671**	**3.44%**	**$66,133**

[1] Present value of payments calculated at net interest rate of 2.38% as payments were determined as a level percentage of payroll.

The valuation as at March 31, 2017 has revealed actuarial gains on a going concern basis. These gains can be applied to reduce the previously scheduled going concern unfunded liability special payments (in accordance with the Regulations under the Nova Scotia *Pension Benefits Act*) to the extent that the remaining special payments are sufficient to amortize the March 31, 2017 unfunded liability. The resulting special payment schedule is as follows:

ANNUAL SPECIAL PAYMENTS[2]

Payment Type	Date Established	Term Remaining	Annual Payment ($000's)	Present Value of Remaining Payments[3] ($000's)
Going Concern	March 31, 2010	8 years	1,422	9,117
Going Concern	March 31, 2013	11 years	1,976	16,089
Total			**$3,398**	**$25,206**

[2] In the previous valuation, special payments were determined on a percentage of payroll basis. In the March 31, 2017 valuation, they are determined as though they are to be made on a flat dollar basis (i.e., the required dollar amount of special payment will not change as payroll increases).

[3] Present value of payments calculated at 6.00% interest rate.

The minimum required special payments are $3,398,000 per annum for the next 8 years, reducing to $1,976,000 for the following 3 years, and are sufficient to amortize the March 31, 2017 unfunded liability of $25,206,000. These payment levels will be reviewed at the time of the next actuarial valuation, due no later than March 31, 2018.

The Plan has a solvency funding exemption as per subsection 19(6) of the Regulations under the Nova Scotia *Pension Benefits Act*; therefore, no special payments are required to amortize the Plan's solvency deficiency.

C. Maximum Contribution

The maximum employer contribution prior to the next valuation is equal to the wind-up deficit plus employer portion of the current service cost ($278,278,000 + $15,275,000 + $8,230,000 = $301,783,000).

D. Timing of Contributions

Employer contributions for current service must be paid in monthly installments, no later than 30 days after the month for which contributions are payable. Special payments must be paid by equal monthly installments, within 30 days following the end of each month.

SECTION V SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

The following represents our primary conclusions as a result of our actuarial valuation of the Dalhousie University Staff Pension Plan as at March 31, 2017:

1. As at the valuation date, there exists a going concern unfunded actuarial liability of $25,206,000.
2. The Plan has a solvency deficiency of $262,447,000 as at March 31, 2017 (after including the present value of 5 years' worth of scheduled special payments).
3. The going concern unfunded actuarial liability must be amortized according to the special payment schedule detailed in Section IV. In summary, special payments are $3,398,000 for the next 8 years, and $1,976,000 for the following 3 years.
4. The cost of benefits accruing in respect of the year following the valuation date is $43,821,000, which amounts to 17.39% of active contributory payroll. Employee regular contributions (6.06% of payroll) and supplementary contributions (2.00% of payroll) are expected to generate contributions of 8.06% of payroll. In addition to the University's matching regular contribution (6.06% of payroll), employer overmatching contributions of 3.27% of payroll are required.
5. The adequacy and appropriateness of this funding level should be reviewed at the next actuarial valuation of this Plan, which should take place as of March 31, 2018 at the latest.
6. For purposes of paragraph 147.2(2)(d) of the *Income Tax Act* (Canada), the excess surplus based on the going concern valuation was nil as of March 31, 2017.
7. If the Plan were to be wound up on the valuation date, the value of Plan assets would be less than the Plan's wind-up liabilities by an amount of $278,278,000.
8. The transfer ratio of the Plan is 81.8%.
9. The previous year credit balance as at March 31, 2017 is $0.
10. We are not aware of any events that occurred between the valuation date and the date this report was completed that would have a material impact on the results of this valuation.

We shall be pleased to provide any additional details or explanations you may require regarding any of the matters dealt with in this report.

SECTION VI ACTUARIAL OPINION

We hereby certify that in our opinion,

(i) the data on which the valuation is based are sufficient and reliable for the purposes of the valuation as described in Section I;

(ii) the assumptions described herein are appropriate for the purposes of the valuation; and

(iii) the methods employed in the valuation are appropriate for the purposes of the valuation.

This report has been prepared, and our opinions given, in accordance with accepted actuarial practice in Canada. It has also been prepared in accordance with the funding and solvency standards set by the Nova Scotia *Pension Benefits Act*.

Nonetheless, emerging experience, differing from the assumptions, will result in gains or losses which will be revealed in future valuations.

Respectfully submitted,

Jeff Turnbull, FSA, FCIA | Colleen Glenn, FSA, ACIA, CERA

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APPENDIX A PLAN ASSETS

The Plan's assets are currently managed in such a way as to allow for a mix of equity and fixed income investments. Several independent fund managers, who deal at arm's length with the University, manage the assets, which are segregated into two trusts: the Pension Trust Fund (PTF) invests the accumulated contributions in respect of active Members and supports benefits payable during the period of active membership, and the Retirees' Trust Fund (RTF) supports pension payments after retirement. The two trusts, together and in aggregate, form the portfolio of assets supporting the Plan.

Reconciliation of Plan Assets

Financial statements of the Plan's holdings, in aggregate by asset class, were provided to us by the University for this valuation. The tables below contain summaries of the revenue accounts for the PTF and the RTF, respectively, based on the information supplied in respect of the period covered by this valuation (i.e., April 1, 2014 through March 31, 2017).

RECONCILIATION OF ASSETS IN THE PENSION TRUST FUND
(ALL FIGURES IN $000'S)

For the Year Ending	March 31, 2015	March 31, 2016	March 31, 2017
Market value at beginning of period	$593,350*	$667,618	$650,233
Employee contributions**	18,048	19,500	20,610
Employer contributions	27,667	28,870	29,280
Net investment income	74,253	(1,373)	71,644
Net change in payables	(279)	2,484	(2,258)
Transfer to RTF	(39,101)	(54,791)	(52,077)
Benefit withdrawals	(6,320)	(12,075)	(12,741)
Market value at end of period	**$667,618**	**$650,233**	**$704,691**

* The beginning of period balance is $104,000 lower than the ending balance at March 31, 2014. This is due to a correction to the investment earnings in fiscal 2013/14 after the completion of the March 31, 2014 valuation.

** Employee contributions include regular contributions, supplementary contributions, additional voluntary contributions, past service purchases, and transfers from other plans.

RECONCILIATION OF ASSETS IN THE RETIREES' TRUST FUND
(ALL FIGURES IN $000'S)

For the Year Ending	March 31, 2015	March 31, 2016	March 31, 2017
Market value at beginning of period	$413,462*	$469,942	$478,089
Transfers in from PTF	39,101	54,791	52,077
Net investment income	46,710	(7,831)	51,265
Net change in payables	3,014	(2,794)	151
Pension payments	(32,345)	(36,019)	(40,032)
Market value at end of period	**$469,942**	**$478,089**	**$541,550**

* The beginning of period balance is $73,000 lower than the ending balance at March 31, 2014. This is due to a correction to the investment earnings in fiscal 2013/14 after the completion of the March 31, 2014 valuation.

Performance of Plan Assets

The following table summarizes the net rate of return on the Plan's assets over the past three years.

PENSION FUND RATES OF RETURN
(NET OF EXPENSES)

12 Months Ending Mar. 31	Pension Trust Fund	Retirees Trust Fund	Total Plan (i.e., Combined PTF and RTF)
2015	12.8%	12.1%	12.5%
2016	(0.4%)	(2.4%)	(1.2%)
2017	11.2%	10.6%	10.9%
3 Year Average	**7.7%**	**6.6%**	**7.2%**

APPENDIX B ACTUARIAL METHODS AND ASSUMPTIONS

A. Valuation of Assets

For the valuation as at March 31, 2017, the market value of assets, plus any net payables / receivables was used as the actuarial value of assets. This is the same asset valuation method as was used in the previous valuation.

The table below summarizes the calculation of the going concern asset value as at March 31, 2017, rounded to the nearest $1,000.

ACTUARIAL VALUE OF ASSETS
(ALL FIGURES IN $000'S)

	March 31, 2017
Market value of assets	$1,246,241
Net payables / receivables	(3,488)
Actuarial value of assets	**$1,242,753**

B. Going Concern Valuation

For the purposes of a going concern valuation, we select actuarial assumptions with a long-term focus. That is, we anticipate that the pension plan will continue indefinitely into the future. Actuarial assumptions are selected giving consideration to historical trends, future expectations and pension plan specific experience, where possible. The assumptions chosen are expected to produce a stable pattern of funding and meet the Plan sponsor's desire to minimize potential for significant shortfalls or deficits in the future.

The purpose of this part of our analysis is to determine an appropriate method and series of assumptions to make proper allowance for the Plan's future liabilities by way of payment of pensions and other benefits. In making these calculations, assumptions must be made as to:

- the probability that a particular payment will be made at a certain time (for example, depending upon whether or not the individual concerned survives to that date); and
- the expected amount of each such payment.

In order to do this, we make a series of assumptions in connection with the many factors which will have a bearing upon the future financial operation of the Plan. These include the following:

- future rates of mortality (and the corresponding life expectancies of the Plan members and their spouses);
- future rates of salary increase for members of the Plan;
- the rate of increase in the maximum pension (as mandated by the *Income Tax Act*) that the Plan is allowed to pay;

- future rates of employee turnover (withdrawal from the Plan);
- the age at which retirement occurs; and
- the propensity for members who are eligible for an immediate pension, but who may choose between the receipt of such pension and a lump-sum termination benefit, to choose the latter.

Finally, we give consideration to the rate of interest that will be earned on the assets of the pension funds in future years.

As part of our process of analysis, all of these factors have received consideration. Where applicable, we have taken into account the actual experience of this pension plan. However, it should be noted that, from a statistical point of view, actual experience data developed from a single pension plan has limited validity unless the number of plan members is very large. Therefore, it becomes necessary to take into account statistics developed from many other larger pension plans.

The assumptions used for the going concern valuation are the same as those used for the previous valuation. The assumptions we have adopted, as well as a brief commentary where appropriate, are described below.

Going Concern Discount Rate Assumption

We have maintained the pre-retirement discount rate assumption at 6.00% per annum.

The economic assumptions (i.e., those related to interest rates and inflation) for this valuation are based on reasonable expectations with respect to the relationships among key economic variables over the long term, as well as the expected impact of those economic variables on the investment performance of the pension fund given the fund's investment policy.

We have taken a "best estimate" approach to the determination of the discount rate, based on the expected future investment return on the assets of the pension plan. In particular, our approach consists of:

- determining the best estimate of long-term, expected future investment returns for the various asset classes in which the Plan invests;
- combining these best estimate, long-term expected future investment returns to reflect the Plan's investment policy, thereby creating an "expected" fund return that is a weighted average of the asset class returns;
- including an allowance for additional return due to active versus passive management, and the impact of rebalancing and diversification, which we have considered appropriate in the circumstance as a result of stochastic modelling specific to the Plan's target asset mix;
- and making appropriate provision for expenses and a provision for adverse deviation.

The result of our analysis is depicted in the following table:

DISCOUNT RATE

	Discount Rate
Unadjusted "best estimate" return	6.20%
Less fees	(0.60%)
Plus value added return from active management	0.40%
Plus "rebalancing and diversification effect"	0.50%
Less provision for adverse deviation	(0.50%)
Equals discount rate	6.00%

In respect of the post-retirement period, we have maintained the assumption used in the last valuation, i.e., 4.55% per annum (except 4.95% per annum for members who retired before June 30, 1994, and 4.65% per annum for members who retired between June 30, 1994 and June 30, 1996).

Salary Scale

Pensions from the Plan are based on the average of an employee's best 3 years of earnings. Since wage levels typically increase over time, an employee's best 3 years of earnings usually occur towards the end of their career. In conducting our valuation, it is prudent to project each employee's accrued pension to the time of their retirement by projecting their earnings level, and this is accomplished through the use of a salary scale assumption.

In respect of the salary scale assumption, the assumption used in the March 31, 2014 actuarial valuation was a flat 2.75% per annum assumption combined with the following merit/promotion table:

- 1.75% for ages below 45;
- 1.00% for ages between 45 and 55; and
- 0.00% for ages after 55.

This assumption has not changed with the March 31, 2017 actuarial valuation. This assumption reflects the low inflation environment that exists at the present time (and that is expected to persist), as well as the future expected pressure on University budgets and funding levels.

Maximum Pension

Pensions are capped by regulation at $2,914.44 per year of service for retirements occurring in 2017. It is expected that this maximum will be increased in accordance with an average wage index from 2017 onward. For purposes of the valuation, we have assumed that the maximum pension will increase after 2017 by 2.75% per annum (i.e., equal to the base salary scale rate). This is the same assumed rate of increase as in the March 31, 2014 valuation.

Going Concern Mortality Assumption

We have retained the mortality assumption used in the previous valuation, i.e., the 2014 Canadian Pensioners' Mortality (Public Sector) Table (CPM 2014 Public) projected generationally with improvement scale CPM-B. The CPM 2014 Public table represents the best available information to date on the mortality patterns of Canadians participating in, or retired from, defined benefit pension plans in the public sector, and as such was considered to offer the most appropriate estimate of mortality patterns for participants in this plan.

Based on this assumption, the life expectancy at age 65 in 2017 is 22.8 years for a male and 24.6 years for a female.

We expect to review the mortality assumption from time to time, both to reflect continued societal improvements in mortality, as well as the development of new actuarial tables and standards.

Retirement Age

There has been no change to the retirement age assumption. Rates of retirement for ages prior to 65 were developed based on experience. In 2009, mandatory retirement was removed in the province of Nova Scotia. Given experience for retirement at ages over 65 is very minimal for Dalhousie, we relied on a research paper prepared by Statistics Canada titled “Mandatory Retirement Rules and the Retirement Decisions of University Professors in Canada” for purposes of determining expected retirement rates for ages between 65 and 71.

Age of Member	Probability of Retirement
55	2%
56	2%
57	3%
58	3%
59	4%
60	6%
61	7%
62	12%
63	12%
64	12%
65	60%
66	25%
67	25%
68	25%
69	25%
70	25%
71	*100%

* Note the 100% reflects the fact that, under the *Income Tax Act*, all Members, whether or not they retire from active employment, must commence their pension by no later than the end of the year in which they turn age 71

With regard to retirement rates between age 65 and age 71, we will continue to monitor actual Dalhousie experience over time, to determine whether the assumed rates of retirement need to be adjusted to be more “Dalhousie-specific”.

SOCC Take-up Rate

Upon termination of employment, a Member is offered the choice between a lump sum transfer from the Plan and a deferred pension. The value of the lump sum transfer is the greater of (i) the Member's "Sum of Contributions Compounded", or "SOCC", which generally represents the Member's required contributions, times two, plus interest, and (ii) the commuted value of the deferred pension.

For each Member of the Plan, we have projected the Member's SOCC to the assumed points of early and normal retirement, and, at each point, compared the SOCC to the amount that would be transferred from the Pension Trust Fund to the Retirees Trust Fund were the Member to retire at that point.

There has been no change to the SOCC Take-up Rate since the previous valuation. We assume that 40% of members (where their projected SOCC is greater than the projected PTF-to-RTF-transfer) at all ages up to and including age 65 would take their SOCC rather than receive an immediate pension.

Withdrawal Rates

The scale of "termination of membership" rates remains unchanged from rates used in the previous valuation. The following table details the rates used in the current valuation.

Service of Member	Termination Rates
1 year	12.0%
2 years	10.2%
3 years	8.7%
4 years	8.4%
5 years	8.4%
6-10 years	6.5%
11-15 years	2.7%
16-20 years	2.7%
21-25 years	0.8%
More than 25 years	0.0%

Termination benefits are projected to each service date, and the liability determined. Projected liabilities take into consideration the minimum withdrawal benefit of twice contributions, plus interest.

Proportion Married and Spouse's Age

We have continued to assume that seventy percent of active members have a spouse at the time of their retirement or death.

We have continued to assume that male spouses are 2 years older than their female counterparts.

Going Concern Actuarial Methods

The actuarial cost method used in conducting this valuation is the projected unit credit method. This is the same method as was used in the previous valuation.

In using this method, as a first step, a calculation is made of the liability in respect of all benefits that have accrued to members on account of service up to and including the valuation date. This represents the "accrued liability". It should be noted that this calculation takes into account projected future pay increases for each member up to and including expected retirement date.

As a completely separate process, the current year cost has been calculated (using the same actuarial assumptions). This represents the cost of providing the benefits that will accrue in respect of the 12-month period following the valuation date. This is compared with the amount of required employee contributions, supplementary contributions, and regular matching employer contributions over that period. The difference represents the additional minimum required employer contribution (referred to as the “overmatching contribution”) necessary in order for these benefits to be properly funded.

For an individual member, the funding pattern produced by the projected unit credit cost method is one that increases (both in dollar terms and as a percentage of salary) over time. However, for the group as a whole, if the average age remains constant (which can occur through the retirement of older members and the addition of new, younger members) and salary levels increase in accordance with the salary scale, the contribution rate recommended under this method will remain relatively constant. If the Plan's average age increases, on the other hand, the current year cost will also increase. Such increases would be revealed in future valuations.

The following table details the actuarial assumptions that have been used in the going concern valuation:

GOING CONCERN VALUATION ACTUARIAL ASSUMPTIONS

March 31, 2017	
Interest	
▪ Pre-retirement:	6.00% p.a.
▪ Post-retirement:	4.55% p.a. for members who retire(d) after June 30, 1994, 4.95% p.a. for members who retired before June 30, 1994, and 4.65% p.a. for members who retired between June 30, 1994 and June 30, 1996
Salary scale:	2.75% p.a. plus merit/promotion scale of 1.75% p.a. for ages below 45, 1.00% p.a. for ages between 45 and 55, and 0.00% for ages after 55
Maximum pension:	$2,914.44 in 2017, increasing at 2.75% p.a. thereafter
Mortality:	2014 Canadian Pensioner Mortality tables (Public Sector) projected generationally with mortality improvement at Scale CPM-B
Retirement age:	In accordance with the retirement rates described previously in this section
Withdrawals:	In accordance with the termination rates described previously in this section
Percentage married:	70% of active members
Spouse's age:	Males spouses are assumed to be 2 years older than their female counterparts
Interest credited on employee contributions:	2.50% p.a.
SOCC take-up assumption:	40% at all ages up to and including age 65
Funding method:	Projected Unit Credit

C. Solvency Valuation

The Nova Scotia *Pension Benefits Act* prescribes a solvency valuation. A solvency valuation permits the regulator to assess the solvency of the Plan should it terminate or wind-up effective on the valuation date. That is, an assessment is made as to whether the assets of the pension fund would be sufficient if no further benefits were provided and all members were paid their entitlements.

For active members not eligible for immediate retirement (i.e., those under age 55), the interest rate used for calculating solvency liabilities was 2.30% p.a. for 10 years and 3.90% p.a. thereafter. These rates were determined in accordance with Section 3500 of the Canadian Institute of Actuaries ("CIA") Standards of Practice – Pension Commuted Values with rates in effect for March 2017. The mortality assumption used was the CPM-2014 (Combined) mortality table projected with Scale CPM-B.

For retired lives and active members 55 or older, the solvency liabilities were calculated using an interest rate of 3.15% per annum and the Canadian Pensioner Mortality (CPM2014 Combined) tables projected generationally with mortality improvement at Scale CPM-B. These assumptions represent the estimated basis for settlement of the Plan's obligations for retired lives by the purchase of insured annuities on the valuation date, and were determined in accordance with the Canadian Institute of Actuaries Educational Note Supplement entitled "Guidance for Assumption for Hypothetical Wind-up and Solvency Valuations Update – Effective March 31, 2017 and Applicable to Valuations with Effective Dates Between March 31, 2017 and December 31, 2017".

Note that the solvency valuation does not make any assumptions about future pay increases or future termination of employment, since all members are assumed to terminate on the valuation date. The actuarial assumptions for the solvency valuation are described in the following table:

SOLVENCY VALUATION ACTUARIAL ASSUMPTIONS

	March 31, 2017
Interest:	For actives < 55, 2.30% p.a. for 10 years, 3.90% p.a. thereafter For pensioners and actives > 55, 3.15% p.a.
Mortality:	2014 Canadian Pensioner Mortality tables (Combined) projected generationally with mortality improvement at Scale CPM-B
Salary scale:	None
ITA maximum pension:	$2,914.44 per year of service
Retirement age:	Age that maximizes the value of the benefits
SOCC take-up assumption:	100% for Active Members less than Age 55; 0% for Active Members greater than Age 55
Withdrawals:	None
Percentage married:	70% of active members
Spouse's age:	Males spouses are assumed to be 2 years older than their female counterparts
Cost method:	Termination method

D. Hypothetical Wind-up Valuation

The only difference between solvency and wind-up assumptions for the Dalhousie Plan is that the wind-up valuation assumptions must account for indexation. However, at the time of this valuation there is no difference in wind-up and solvency assumptions because interest rates are at levels low enough that there is no expectation of excess interest indexing. Therefore, the wind-up valuation liability assumptions are the same as those used in the solvency valuation.

APPENDIX C MEMBERSHIP DATA

The data in respect of active membership (including members on disability or leave of absence), and in respect of all pensioners and deferred pensioners are maintained on a computerized pension administration system called Ariel. The system is updated by Pensions and Employee Benefits, a unit of Dalhousie University's Human Resources Department. The information was extracted by Morneau Shepell (the Ariel vendor) and submitted to us in electronic format.

There were 3,085 active members at March 31, 2017, an increase of 49 since the previous valuation. The tables below provide a reconciliation of the active membership and a brief statistical profile of the active group. In addition, we have provided age/service/salary summaries for the active population. The data received contained pertinent information for each Member, such as birth date, date of employment, years of service, rates of pay, and accumulated contributions plus interest.

The total number of individuals entitled to receive a deferred pension from the pension fund was 118. The total number of retirees receiving payments from the pension fund as of the valuation date was 1,133. Reconciliations in respect of retired Plan Members, and brief statistical profiles of each distinct group (i.e., deferred pensioners and pensioners) may be found in the tables below. A more complete summary of the pensioner data is also provided below.

We have reviewed the data as to accuracy and reasonableness. By comparing the data to those provided in previous years and examining the level of membership cessation over the previous years, we are satisfied that the data are complete. In addition, we performed various checks of reasonableness on dates of employment, Plan membership, and birth. We also compared lists of active members with lists of inactive and retired members to check for duplicates. In all cases, we found the data to be sufficient and reliable for the purposes of the valuation. Appendix E contains a confirmation by Dalhousie University as to the accuracy and completeness of the data provided.

RECONCILIATION OF MEMBERSHIP

Actives	Males	Females	Total
Number as at March 31, 2014	1,296	1,740	3,036
New entrants	237	407	644
Retirements (i.e., transfers to the RTF)	(102)	(127)	(229)
Deaths, termination refunds, transfers and pending transfers	(142)	(224)	(366)
Number as at March 31, 2017	1,289	1,796	3,085

Pensioners & Survivors	Males	Females	Total
Number as at March 31, 2014	453	455	908
New retirees (from active and deferred) and survivors	119	177	296
Deaths	(38)	(32)	(70)
Consolidation of multiple records	(1)	0	(1)
Total Retirees as at March 31, 2017	533	600	1,133

Deferred	Males	Females	Total
Number as at March 31, 2014	63	67	130
New deferred retirements	1	9	10
Deaths & retirements	(6)	(16)	(22)
Data Adjustment	(1)	1	0
Total Deferred as at March 31, 2017	57	61	118

STATISTICAL PROFILE OF ACTIVE MEMBERS

	Number*	Average Age	Average Credited Service	Expected Salary, Year Following March 31, 2017	Average Accumulated Contributions**
Males	1,257	49.6	12.3	$93,535	$105,610
Females	1,761	48.3	11.5	$76,368	$73,230
Total	3,018	48.8	11.9	$83,518	$86,716

* These figures do not include 67 individuals who have reached 35 years pensionable service and are therefore no longer accruing benefits for future service.

** Includes past service contributions and transfers into the Plan

MARCH 31, 2014 TABLES FOR COMPARISON

Total	2,969	48.4	11.6	$77,971	$78,177

STATISTICAL PROFILE OF DEFERRED PENSIONERS (UNDER DEFERRAL VIA THE RTF*)

	Number	Average Age	Average Deferred Account Balance
Males	7	62.2	$599,174
Females	12	62.2	$560,621
Total	19	62.2	$574,825

* Under “deferral via the RTF”, the individual is entitled to a pension that can be provided by their deferred account balance (determined on an actuarial equivalent basis).

MARCH 31, 2014 TABLES FOR COMPARISON

Total	19	61.2	$411,214

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STATISTICAL PROFILE OF PENSIONERS (INCLUDING SURVIVORS)

	Number	Average Age	Average Annual Lifetime Pension
Males	533	73.8	$47,722
Females	600	71.7	$27,465
Total	1,133	72.7	$36,995

MARCH 31, 2014 TABLES FOR COMPARISON

Total	908	72.8	$33,467

SALARY/ AGE/ SERVICE DISTRIBUTION FOR ALL ACTIVE MEMBERS

	Service (years)							
Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-29**	**30+**	**Total**
20-24	12 553,582 46,132							12 553,582 46,132
25-29	84 4,260,263 50,717	10 467,110 46,711						94 4,727,372 50,291
30-34	155 10,172,980 65,632	69 4,190,896 60,738	5 256,618 51,324					229 14,620,494 63,845
35-39	164 12,109,570 73,839	122 9,074,610 74,382	40 2,793,567 69,839	5 282,985 56,597				331 24,260,732 73,295
40-44	130 10,232,360 78,710	127 10,571,444 83,240	104 10,342,647 99,449	37 2,761,578 74,637	4 258,942 64,735			402 34,166,971 84,992
45-49	112 8,648,596 77,220	115 9,883,470 85,943	140 13,975,946 99,828	90 8,660,117 96,224	41 2,773,901 67,656	4 277,598 69,399	2 123,748 61,874	504 44,343,376 87,983
50-54	82 6,830,435 83,298	90 6,162,872 68,476	98 8,859,671 90,405	91 8,947,367 98,323	39 3,590,238 92,057	74 4,459,283 60,261	8 499,913 62,489	482 39,349,779 81,639
55-59	67 4,858,874 72,521	71 5,386,827 75,871	87 7,104,634 81,662	89 8,258,854 92,796	76 7,762,669 102,140	72 6,324,463 87,840	50 3,191,727 63,835	512 42,888,049 83,766
60-64	25 1,893,890 75,756	46 4,116,471 89,489	53 4,537,241 85,608	54 5,786,512 107,158	49 5,442,979 111,081	67 7,227,121 107,867	37 3,859,197 104,303	331 32,863,409 99,285
65-69	8 875,493 109,437	12 1,017,591 84,799	27 2,530,664 93,728	11 1,321,848 120,168	11 1,589,493 144,499	17 2,243,227 131,955	24 3,377,551 140,731	110 12,955,867 117,781
70+		2 215,533 107,767	2 190,089 95,044	2 293,448 146,724	2 189,655 94,827		3 440,172 146,724	11 1,328,896 120,809
Grand Total	**839 60,436,043 72,033**	**664 51,086,824 76,938**	**556 50,591,076 90,991**	**379 36,312,707 95,812**	**222 21,607,877 97,333**	**234 20,531,692 87,742**	**124 11,492,306 92,680**	**3,018 252,058,527 83,518**

Key: Each cell contains the following information (in order): a “count” of the number of members who fit within the cell’s parameters (for instance, the cell in the upper left corner indicates that 12 members are between the ages of 20 and 24, **and** have between 0 and 4 years of service); the total salaries paid to the members in the cell; and the average salary of members in the cell (the upper left cell, for instance, shows that the 12 members earned a total of $553,582, or an average of $46,132).

Note: These figures do not include individuals who have reached 35 years pensionable service and are therefore no longer accruing benefits for future service. There are 67 such members.

SALARY/ AGE/ SERVICE DISTRIBUTION FOR ACTIVE MEMBERS – MALES ONLY

	Service (years)							
Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-29**	**30+**	**Total**
20-24	2 81,864 40,932							2 81,864 40,932
25-29	23 1,200,071 52,177	4 193,013 48,253						27 1,393,084 51,596
30-34	61 4,172,743 68,406	24 1,601,606 66,734	1 60,179 60,179					86 5,834,529 67,843
35-39	67 5,422,064 80,926	48 3,724,110 77,586	14 1,079,529 77,109	3 176,538 58,846				132 10,402,241 78,805
40-44	59 5,075,536 86,026	59 5,242,151 88,850	47 5,019,429 106,796	14 1,088,084 77,720	2 143,415 71,707			181 16,568,614 91,539
45-49	47 4,046,359 86,093	47 4,447,601 94,630	65 6,844,885 105,306	38 3,903,914 102,735	14 1,078,001 77,000	2 182,332 91,166		213 20,503,092 96,259
50-54	34 2,982,456 87,719	36 2,680,070 74,446	39 4,035,358 103,471	43 4,786,643 111,317	20 1,910,109 95,505	19 1,146,597 60,347		191 17,541,233 91,839
55-59	24 1,852,419 77,184	29 2,378,445 82,015	31 3,049,521 98,372	36 3,718,128 103,281	40 4,601,758 115,044	30 2,999,972 99,999	9 710,673 78,964	199 19,310,916 97,040
60-64	6 414,893 69,149	15 1,408,285 93,886	20 2,065,378 103,269	24 2,834,467 118,103	28 2,990,583 106,807	34 4,046,194 119,006	25 2,824,570 112,983	152 16,584,368 109,108
65-69	4 510,161 127,540	8 696,541 87,068	14 1,499,615 107,115	5 683,858 136,772	8 1,149,322 143,665	8 1,121,884 140,236	19 2,699,955 142,103	66 8,361,335 126,687
70+		1 68,810 68,810	2 190,089 95,044	2 293,448 146,724	1 146,724 146,724		2 293,448 146,724	8 992,517 124,065
Grand Total	**327** **25,758,566** **78,772**	**271** **22,440,630** **82,807**	**233** **23,843,982** **102,335**	**165** **17,485,078** **105,970**	**113** **12,019,911** **106,371**	**93** **9,496,979** **102,118**	**55** **6,528,646** **118,703**	**1,257** **117,573,793** **93,535**

Key: Each cell contains the following information (in order): a "count" of the number of members who fit within the cell's parameters; the total salaries paid to the members in the cell; and the average salary of members in the cell.

Note These figures do not include individuals who have reached 35 years pensionable service and are therefore no longer accruing benefits for future service.

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SALARY/ AGE/ SERVICE DISTRIBUTION FOR ACTIVE MEMBERS – FEMALES ONLY

	Service (years)							
Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-29**	**30+**	**Total**
20-24	10 471,718 47,172							10 471,718 47,172
25-29	61 3,060,191 50,167	6 274,097 45,683						67 3,334,288 49,765
30-34	94 6,000,237 63,832	45 2,589,290 57,540	4 196,438 49,110					143 8,785,965 61,440
35-39	97 6,687,506 68,943	74 5,350,500 72,304	26 1,714,038 65,925	2 106,447 53,224				199 13,858,491 69,641
40-44	71 5,156,824 72,631	68 5,329,293 78,372	57 5,323,218 93,390	23 1,673,494 72,761	2 115,527 57,763			221 17,598,357 79,631
45-49	65 4,602,238 70,804	68 5,435,868 79,939	75 7,131,061 95,081	52 4,756,203 91,465	27 1,695,901 62,811	2 95,265 47,633	2 123,748 61,874	291 23,840,284 81,925
50-54	48 3,847,979 80,166	54 3,482,802 64,496	59 4,824,313 81,768	48 4,160,724 86,682	19 1,680,129 88,428	55 3,312,686 60,231	8 499,913 62,489	291 21,808,546 74,943
55-59	43 3,006,456 69,918	42 3,008,382 71,628	56 4,055,112 72,413	53 4,540,726 85,674	36 3,160,912 87,803	42 3,324,491 79,155	41 2,481,054 60,514	313 23,577,133 75,326
60-64	19 1,478,997 77,842	31 2,708,187 87,361	33 2,471,863 74,905	30 2,952,045 98,402	21 2,452,396 116,781	33 3,180,926 96,392	12 1,034,627 86,219	179 16,279,041 90,944
65-69	4 365,332 91,333	4 321,051 80,263	13 1,031,050 79,312	6 637,990 106,332	3 440,172 146,724	9 1,121,343 124,594	5 677,595 135,519	44 4,594,532 104,421
70+		1 146,724 146,724			1 42,931 42,931		1 146,724 146,724	3 336,379 112,126
Grand Total	**512 34,677,477 67,729**	**393 28,646,194 72,891**	**323 26,747,094 82,808**	**214 18,827,629 87,980**	**109 9,587,967 87,963**	**141 11,034,712 78,260**	**69 4,963,661 71,937**	**1,761 134,484,734 76,368**

Key: Each cell contains the following information (in order): a "count" of the number of members who fit within the cell's parameters; the total salaries paid to the members in the cell; and the average salary of members in the cell.

Note: These figures do not include individuals who have reached 35 years pensionable service and are therefore no longer accruing benefits for future service.

PENSIONERS

Age at Valuation	Female	Male	Total
45 to 49	2		2
	53,683		53,683
	26,841		26,841
50 to 54	1	1	2
	12,898	6,647	19,545
	12,898	6,647	9,773
55 to 59	27	13	40
	437,382	235,979	673,360
	16,199	18,152	16,834
60 to 64	101	48	149
	3,367,941	1,531,069	4,899,010
	33,346	31,897	32,879
65 to 69	167	108	275
	4,780,955	5,052,138	9,833,093
	28,628	46,779	35,757
70 to 74	126	164	290
	3,375,512	8,789,333	12,164,846
	26,790	53,593	41,948
75 to 79	71	89	160
	1,964,593	4,661,800	6,626,393
	27,670	52,380	41,415
80 to 84	50	51	101
	1,342,248	2,419,228	3,761,475
	26,845	47,436	37,242
85 to 89	35	36	71
	709,034	1,702,795	2,411,830
	20,258	47,300	33,969
90 to 94	14	20	34
	322,731	917,054	1,239,786
	23,052	45,853	36,464
95 and over	6	3	9
	112,280	119,640	231,920
	18,713	39,880	25,769
Total count by gender	**600**	**533**	**1,133**
Total lifetime benefit	**16,479,257**	**25,435,684**	**41,914,941**
Total average lifetime benefit	**27,465**	**47,722**	**36,995**

Key: Each cell contains the following information (in order): count, sum of lifetime retirement benefit, and average lifetime retirement benefit.

APPENDIX D SUMMARY OF PLAN PROVISIONS

The following is a summary of the Plan's main provisions in effect on March 31, 2017. This summary is not intended as a complete description of the Plan. For specific details of the Plan provisions, reference should be made to the Plan text.

Effective Date of the Plan

Contributions to this Plan (and eligibility for pension benefits) commenced effective September 1, 1959.

Eligibility and Membership

Up to June 30, 1996 all full-time employees and regular part-time employees of Dalhousie University are eligible to join the Plan upon completion of at least 75 days of employment with the University. After June 30, 1996 eligibility for membership occurs at the date of employment.

Statutory part-time employees may elect to join the Plan following completion of two consecutive calendar years of employment during which, in each of the calendar years, their earnings were at least 35% of the Canada Pension Plan YMPE, or their hours worked were at least 700.

Required Contributions

A. By Members: 4.65% of the first $5,000 of annual salary plus 6.15% of annual salary in excess of $5,000 (where the salary is ultimately limited to that which would produce a pension entitlement in the year equal to the maximum pension for that year according to the provisions of the *Income Tax Act*), plus Supplementary Contributions in the amount of 2.00% of the same annual salary.

B. By the University: the amount required to meet the cost of all benefits not met by the Members' required contributions.

Interest

Any refund of contributions, payable either to a member or his or her estate, includes interest credited each year from the 1st of October at a rate based on the average of the yields of 5-year personal fixed term chartered bank deposit rates (CANSIM series V122515) over the 12-month period ending on the most recent June 30th.

Normal Retirement Date

The normal retirement date for all employees is the July 1st immediately following attainment of age 65 except for those members who were on full-time staff prior to July 1, 1964. In the latter case, normal retirement date is the 1st day of September immediately following the attainment of age 65.

Early Retirement

A member who has attained age 55 may retire at any time prior to attainment of his or her normal retirement age. In these circumstances, the member would receive a reduced pension in accordance with the following table:

Full Years Prior to Age 65	Early Retirement Adjustment Factor	
	For benefits earned after June 30, 2004	For benefits earned up to June 30, 2004
10	.63	.76
9	.66	.80
8	.69	.84
7	.72	.88
6	.75	.92
5	.78	.95
4	.81	.98
3	.85	1.00
2	.90	1.00
1	.95	1.00

These adjustment factors are interpolated where retirement occurs between anniversary dates. Under Phase Three of the Surplus Use Agreement (1996), these reduction factors are applicable prior to exact age 65 instead of the normal retirement date.

Partial Early Retirement and Reduced Workload Arrangements

Any regular full-time staff member may apply for partial early retirement through an approved reduced workload arrangement provided that he or she has completed at least three years of Continuous full-time or regular part-time employment since last date of hire. A Reduced Workload Period shall be for a fixed term. Participation in and approval of such RWA is by mutual consent, and is not extended as a matter of right.

In respect of any Member working under an RWA, the following shall apply:

(1) the calculation of the Member's pension benefit shall be based on the Member's Nominal Salary (pre-RWA Salary with adjustments for salary increases) rather than the actual Salary received by the Member under RWA;

(2) the Member will make pension contributions through payroll deduction based on the actual Salary received during the period rather than the Member's Nominal Salary on which the benefits are based; and

(3) the University will pay contributions on behalf of the Member in respect of the difference between the Member's actual Salary and Nominal Salary as well as its contributions on the Nominal Salary.

This provision does not mean that a member can retire and commence receipt of pension benefits and continue to accrue benefits simultaneously. Such action is not permitted.

Deferment of Pension Benefits

Any member eligible to receive a pension (either at normal or early retirement age) may elect to defer commencement of pension payments until some later date (but not beyond the end of the calendar year the member attains age 71 in any event). In these circumstances, the actuarial equivalent value of the member's pension as of the selected retirement date is transferred into the Retirees' Trust Fund, and is credited with investment income until the member's pension payments start. The actual pension payable from deferred retirement date is calculated on a consistent actuarial equivalent basis. The ultimate pension at date of commencement must not exceed the maximum pension payable from a Defined Benefit Plan, as prescribed in the *Income Tax Act*.

Pension at Normal Retirement

The pension provided under this Plan is expressed as a certain percentage of the average of the best three years of remuneration received by the member.

For the total period of membership in the Plan, the percentage applicable is 2% multiplied by the number of years of participation during that period.

The annual amount of lifetime pension payable to members, excluding any benefits derived from the member's AVCs, for the calendar year in which these benefits commence to be paid shall not exceed the product of:

A. the number of years of Pensionable Service of the Member which, when combined with the Member's Pensionable Service prior to January 1, 1992, if any, will not exceed 35 years, and

B. the lesser of:

   (1) 1/9 of the Money Purchase Limit in the calendar year in which benefits commence, and

   (2) 2% of the average of Member's best three consecutive years of Compensation in respect of the Employer.

Type of Pension

Pensions are payable throughout the lifetime of a Pensioner. For service up to June 30, 2004, the minimum guaranteed number of payments for single members or for married members electing a single life form of pension is 120 months. For married members electing a joint form of pension, the normal form of pension is a lifetime pension payable to the member and spouse jointly. The benefit is payable at a rate reduced by one third to the spouse should the spouse survive the member, provided that the spouse is not younger than the member by more than 60 months. If the spouse is younger by more than 60 months, the benefit is reduced in consideration of the actual age of the spouse to be actuarially equivalent to the benefit payable to a member whose spouse is 60 months younger. No fewer than 60 monthly payments shall be paid in any event.

For service from July 1, 2004, the normal form of pension for all members is a lifetime pension payable to the member, with a guarantee that no fewer than 84 payments shall be paid in any event.

A member with a spouse is required to receive a pension which includes a 60% survivor's pension; such pension being the actuarial equivalent of the pension otherwise payable in the normal form. Other optional forms of pension are available on an actuarial equivalent basis subject to signature of a waiver form by member and spouse.

Adjustment to Pensions in Course of Payment

Effective July 1, 1982, the decision was made to discontinue the previous policy of purchasing immediate annuities from life insurance companies in respect of retiring employees. Accordingly, a separate Retirees' Trust Fund was established and, in respect of employees retiring on or after July 1, 1982, pension payments are being made directly from this Retirees' Trust Fund.

At the time of retirement, a capital sum is transferred from the Pension Trust Fund into the Retirees' Trust Fund in respect of each retiring employee; the amount of this transfer being based on the mortality and interest assumptions used in the most recent actuarial valuation of this Pension Plan.

The three-year average investment yield on the Retirees' Trust Fund in excess of the post-retirement interest assumption (PRIA) will be used to fund indexing of pensions in the manner described below, subject to a "hold back" as a provision against life expectancy variations and other contingencies of 0.1% for Members who retired prior to June 30, 1994, 0.4% for Members who retired on or after June 30, 1994 but before June 30, 1996 and 0.5% for Members who retired on or after June 30, 1996.

In addition, accumulated pension increases shall not exceed corresponding accumulated increases in the Consumer Price Index.

Notwithstanding the above, in the event that the applicable three-year average investment yield on the Retirees' Trust Fund does not exceed the PRIA by the "hold back" percentages, then there shall be no adjustment to pensions in course of payment for that year except as may be provided with surplus funds. Furthermore, in these circumstances, there will be a corresponding reduction in the rate of increase of pensions in the following year or years of such amount, or amounts that would be required to bring pensions in course of payment to the same level that would apply if negative adjustments had been made in those years when the three-year average investment yield on the Retirees' Trust Fund did not exceed the PRIA by the "hold back" percentages.

The first such increase took effect as of January 1, 1984, and further increases after that date – to the extent an adjustment can be made – take place on each subsequent 1st of January.

Death Benefits Before Retirement

Upon death prior to retirement, the benefit payable to the member's spouse or beneficiary is an amount equal to the sum of:

(i) The greater of

a. The Member's required contributions plus interest in respect of service prior to January 1, 1988, plus 100% of the Commuted Value of the Member's pension accrued to the date of death, in respect of service after December 31, 1987; and

b. An amount equal to the Sum of Contributions Compounded of the Member up to the date of death; and

(ii) The Member's additional voluntary contributions plus interest.

In lieu of the lump sum described above, the Member's spouse can elect to receive a lifetime pension equal to the actuarial equivalent of the lump sum.

Disability Benefit

In the event that a member becomes totally and permanently disabled prior to normal retirement date, and becomes eligible to receive benefits under the University's Long Term Disability Plan, provision is made for the continuation of joint contributions to the Pension Plan while the member is receiving LTD Benefits until normal retirement age. At that time, the disability benefit ceases, and a pension will become payable under this Plan with full credit being given both for years of active participation and for years when the member continued to contribute to the Plan while disabled.

Termination of Employment

A Member who terminates employment is entitled to a deferred pension payable at the normal retirement date. A Member can elect to receive an early retirement pension which is the pension payable at the normal retirement date, with the appropriate actuarial reduction factors applied, as outlined above.

In lieu of a pension benefit as described above, a Member may elect to have the greater of (i) their Locked-in Contributions, and (ii) the Commuted Value of the Member's pension accrued to the date of termination, including any 50% rule excess employee contributions, transferred to a Registered Plan permitted under the *Pension Benefits Act* and the *Income Tax Act*, provided that such arrangement is administered as locked-in as required by the *Pension Benefits Act*.

APPENDIX E EMPLOYER CERTIFICATION

On behalf of Dalhousie University, I hereby certify that the employee data provided to Eckler Ltd. for the purposes of the actuarial valuation of the Dalhousie University Staff Pension Plan as at March 31, 2017 are accurate and complete.

LAURIE CREELMAN
Name

Laurie Creelman
Signature

Senior Pension Advisor
Title

November 22, 2017
Date