HEALTH WEALTH CAREER

THE COLLEGES OF APPLIED ARTS AND TECHNOLOGY PENSION PLAN

REPORT ON THE ACTUARIAL VALUATION FOR FUNDING PURPOSES AS AT JANUARY 1, 2019

MARCH 2019

Financial Services Commission of Ontario and

Canada Revenue Agency Registration Number: 0589895

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To prepare the results in this report, actuarial assumptions are used to model a single scenario from a range of possibilities for each valuation basis. The results based on that single scenario are included in this report. However, the future is uncertain and the plan's actual experience will differ from those assumptions; these differences may be significant or material. Different assumptions or scenarios within the range of possibilities may also be reasonable, and results based on those assumptions would be different. Furthermore, actuarial assumptions may be changed from one valuation to the next because of changes in regulatory and professional requirements, developments in case law, plan experience, changes in expectations about the future, and other factors.

The valuation results shown in this report also illustrate the sensitivity to one of the key actuarial assumptions, the discount rate. We note that the results presented herein rely on many assumptions, all of which are subject to uncertainty, with a broad range of possible outcomes, and the results are sensitive to all the assumptions used in the valuation.

Should the plan be wound up, the going concern funded status and solvency financial position, if different from the wind-up financial position, become irrelevant. The hypothetical wind-up financial position estimates the financial position of the plan assuming it is wound up on the valuation date. Emerging experience will affect the wind-up financial position of the plan assuming it is wound up in the future. In fact, even if the plan were wound up on the valuation date, the financial position would continue to fluctuate until the benefits are fully settled.

Decisions about benefit changes, granting new benefits, investment policy, funding policy, benefit security, and/or benefit-related issues should not be made solely on the basis of this valuation, but only after careful consideration of alternative economic, financial, demographic, and societal factors, including financial scenarios that assume future sustained investment losses.

Funding calculations reflect our understanding of the requirements of the Ontario Pension Benefits Act, the Income Tax Act, and related regulations that are effective as of the valuation date. Mercer is not a law firm, and the analysis presented in this report is not intended to be a legal opinion. You should consider securing the advice of legal counsel with respect to any legal matters related to this report.

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INTRODUCTION

TO THE BOARD OF TRUSTEES OF THE CAAT PENSION PLAN

At the request of the Board of Trustees of The Colleges of Applied Arts and Technology Pension Plan (the "Board"), we have conducted an actuarial valuation of The Colleges of Applied Arts and Technology Pension Plan (the "Plan") as at the valuation date, January 1, 2019. We are pleased to present the results of the valuation.

PURPOSE

The purpose of this valuation is to determine:

- The funded status of the Plan as at January 1, 2019 on going concern, hypothetical wind-up, and solvency bases; and
- The required contributions from 2019, in accordance with the *Pension Benefits Act (Ontario)* ("the Act").

The information contained in this report was prepared for the internal use of the Board of Trustees, the Sponsors' Committee, and Plan staff, and for filing with the Financial Services Commission of Ontario and with the Canada Revenue Agency, in connection with our actuarial valuation of the Plan. This report will be filed with the Financial Services Commission of Ontario and with the Canada Revenue Agency. This report is not intended or suitable for any other purpose.

In accordance with Section 14 of the regulations to the *Pension Benefits Act (Ontario)*, the next actuarial valuation of the Plan will be required as at a date not later than January 1, 2022, or as at the date of an earlier amendment to the Plan that would have a material impact on the valuation results.

TERMS OF ENGAGEMENT

In accordance with our terms of engagement with the Board, our actuarial valuation of the Plan is based on the following material terms:

- We have not reflected a margin for adverse deviations in the going concern valuation.

- We have reflected the Board's decisions for determining the solvency funding requirements, summarized as follows:

  – The same Plan wind-up scenario was hypothesized for both hypothetical wind-up and solvency valuations.

  – Certain excludable benefits were excluded from the solvency liabilities.

  – The solvency financial position was determined on a market value basis.

  – The solvency deficiency, as defined in the Regulations to the *Pension Benefits Act (Ontario),* has been specified to be zero in accordance with Section 1.3.1(3) of the Regulations.

  See the Valuation Results - Solvency section of the report for more information.

EVENTS SINCE THE LAST VALUATION AT JANUARY 1, 2018

Pension Plan

Since the last valuation date, the Plan was amended to add a new "Design Two" provision (also referred to as "DBplus"). The original provision is referred to as "Design One" or "DBprime". Members who work part-time or on contract (referred to as "other than regular full-time" or "OTRFT") began accruing future benefits under the Design Two provisions for service on and after January 1, 2019 (their past service benefits remain under Design One). In addition, Torstar Corporation became a new participating employer, and their employees who were participating in a Torstar defined benefit plan began accruing benefits under the Design Two provisions effective October 1, 2018. The impact of these amendments has been reflected in this valuation.

There have been no other special events since the last valuation date.

The Plan is fully funded on a going-concern basis as of January 1, 2019. Since the Plan provides for certain benefits that are contingent upon the funded status of the Plan, we have made an allowance in the Plan's actuarial liability for those adjustments that may occur prior to the filing of the next expected actuarial valuation (January 1, 2022), i.e., at January 1, 2020, 2021 and 2022.

Assumptions

We have used the same going concern valuation assumptions and methods as were used for the previous valuation, except for the following.

	CURRENT VALUATION	PREVIOUS VALUATION
Discount rate:	5.50%	5.60%
Interest on member contributions:	2.20%	2.30%
Basis used to determine lump sums	Non-indexed interest rates 2.8% per year for 10 years, 3.2% per year thereafter Partially indexed interest rates 1.9% per year for 10 years, 2.1% per year thereafter	Non-indexed interest rates 2.8% per year for 10 years, 3.3% per year thereafter Partially indexed interest rates 1.7% per year for 10 years, 1.9% per year thereafter

A summary of the going concern methods and assumptions is provided in Appendix C.

The hypothetical wind-up and solvency assumptions have been updated to reflect market conditions at the valuation date, and to exclude grow-in benefits pursuant to the Board's election to opt out of providing grow-in benefits pursuant to Section 74.1 of the Act. A summary of the hypothetical wind-up and solvency methods and assumptions is provided in Appendix D.

Regulatory Environment and Actuarial Standards

There have been no changes to the Act or the relevant regulations which impact the funding of the Plan.

SUBSEQUENT EVENTS

The Plan has entered into agreements with some single employer pension plan (SEPP) sponsors where, subject to member consent and/or regulatory approval, the assets and liabilities of the SEPPs would be transferred into the Plan. Our valuation reflects the impact of former members of these SEPPs that were participating in the Plan prior to January 1, 2019, most notably employees of the Torstar Corporation that entered the Plan on October 1, 2018. Our valuation does not account for any SEPP assets and liabilities yet to be transferred into the Plan, and does not account for employee groups who joined the Plan on or after January 1, 2019. The appropriate past service SEPP benefits will be valued in the next valuation following the transfer of the corresponding SEPP assets and liabilities.

After checking with representatives of the Plan, to the best of our knowledge there have been no other events subsequent to the valuation date which, in our opinion, would have a material impact on the results of the valuation. Our valuation reflects the financial position of the Plan as of the valuation date and does not take into account any experience after the valuation date.

IMPACT OF CASE LAW

This report has been prepared on the assumption that all claims on the Plan after the valuation date will be in respect of benefits payable to members of the Plan determined in accordance with the Plan terms and that all Plan assets are available to provide for these benefits. It is possible that court and regulatory decisions and changes in legislation could give rise to additional entitlements to benefits under the Plan and cause the results in this report to change.

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VALUATION RESULTS – GOING CONCERN

FINANCIAL STATUS – CURRENT VALUATION

A going concern valuation compares the value of Plan assets, including expected future contributions, and the present value of expected future benefit cash flows in respect of accrued service and future service for the current membership, assuming the Plan will be maintained indefinitely.

The results of the current valuation, compared with those from the previous valuation, are summarized as follows:

(000'S)	01.01.2019	01.01.2018
Assets		
Market value of assets	$10,817,600	$10,821,000
Asset smoothing adjustment	($161,400)	($977,400)
Smoothed value of assets	$10,656,200	$9,843,600
Present value of future contributions		
• Basic contributions - DBprime	$3,341,200	$3,572,300
• Supplemental contributions - DBprime	$1,274,100	$1,365,600
• Basic contributions – DBplus	$535,000	$0
Actuarial value of assets	$15,806,500	$14,781,500
Going concern funding target		
Present value of accrued benefits for:		
• Active members - DBprime	$4,295,100	$4,188,800
• Active members - DBplus	$1,900	$0
• Pensioners	$4,939,000	$4,656,100
• Survivors	$238,000	$226,700
• Deferred pensioners	$123,400	$109,300
• Terminations in progress	$7,800	$7,900
• Refunds	$900	$1,000
Total liabilities for accrued benefits	$9,606,100	$9,189,800
Present value of future benefits - DBprime	$3,160,500	$3,282,800
Present value of future benefits – DBplus	$371,100	$0
Provision for conditional benefits to the year of the next required valuation	$50,500	$40,400
Total actuarial liability	$13,188,200	$12,513,000
Funding excess (shortfall)	$2,618,300	$2,268,500

The going concern funding target is based on best-estimate assumptions and does not include a provision for adverse deviations.

RECONCILIATION OF FINANCIAL STATUS (000'S)

Funding excess (shortfall) as at previous valuation		$2,268,500
Interest on funding excess (shortfall) at 5.60% per year		$127,000
Recognition of additional year of supplemental contributions		$76,000
Expected funding excess (shortfall)		$2,471,500
Net experience gains (losses)		
• Investment return	($626,100)	
• Increases in pensionable earnings/YMPE	$80,400	
• Termination experience	$32,000	
• Inflation experience	($4,000)	
• Mortality experience	($2,500)	
• Retirement experience	($14,500)	
• Present value of future contributions in excess of future benefits for new entrants	$37,500	
Total experience gains (losses)		($497,200)
Impact of changes in assumptions		
• Discount rate	($164,700)	
• Basis to determine lump sum value and interest on member contributions	($6,900)	
Total assumption changes impact		($171,600)
Extension of conditional benefits to Jan. 1, 2022		($18,700)
OTRFT members participating in Design Two effective Jan 1, 2019		($59,100)
Torstar Corporation DB employees entering on Oct. 1, 2018		$24,900
Impact of asset smoothing		$870,800
Net impact of other elements of gains and losses		($2,300)
Funding excess (shortfall) as at current valuation		$2,618,300

REFERENCE VALUATION

Prior to January 1, 2018, pursuant to Section 4(2.2) of the Regulations to the *Act,* a going-concern valuation of the Plan using an actuarial cost method that is not a benefit allocation method, must test the present value of minimum required contributions under the Current Valuation against a valuation prepared ("the Reference Valuation") using a benefit allocation method (projected unit credit in the case of this valuation).

As at January 1, 2018, an amendment to the Regulations to the *Pension Benefits Act (Ontario)* made permanent the temporary exemption for plans named in Section 47.7.1 of the Regulations from requiring scheduled contributions to meet minimum contribution requirements determined by the Reference Valuation. However, the regulator has requested that a Reference Valuation continue to be prepared and disclosed.

The results of the Reference Valuation, compared with those from the previous valuation, are summarized as follows:

(000'S)	01.01.2019	01.01.2018
Assets		
Market value of assets	$10,817,600	$10,821,000
Asset smoothing adjustment	($161,400)	($977,400)
Smoothed value of assets	$10,656,200	$9,843,600
Going concern funding target		
Present value of accrued benefits for:		
– Active members - DBprime	$4,295,100	$4,188,800
– Active members - DBplus	$1,900	$0
– Pensioners	$4,939,000	$4,656,100
– Survivors	$238,000	$226,700
– Deferred pensioners	$123,400	$109,300
– Terminations in progress	$7,800	$7,900
– Refunds	$900	$1,000
– Provision for conditional benefits to the year of the next required valuation	$47,800	$39,500
Total liabilities for accrued benefits	$9,653,900	$9,229,300
Funding excess (shortfall)	$1,002,300	$614,300

The actuarial assumptions used for the Reference Valuation are identical to those used under the going-concern valuation. The going concern funding target in the Reference Valuation is based on best estimate assumptions and does not include a provision for adverse deviations.

CURRENT SERVICE COST

The current service cost is an estimate of the present value of the additional expected future benefit cash flows in respect of pensionable service that will accrue after the valuation date, assuming the Plan will be maintained indefinitely.

The current service cost during the year following the valuation date, compared with the corresponding value determined in the previous valuation, is as follows:

(000'S)	2019	2018
Current service cost - DBprime	$268,600	$283,400
Current service cost – DBplus	$33,200	$0
Total current service cost	$301,800	$283,400
Current service cost expressed as a percentage of members' pensionable earnings - DBprime	15.70%	15.35%
Current service cost expressed as a percentage of members' pensionable earnings - DBplus	11.33%	N/A
Total current service cost expressed as a percentage of total members' pensionable earnings	15.06%	15.35%

DISCOUNT RATE SENSITIVITY

The following table summarizes the effect of using a discount rate which is 1% lower than that used in the valuation on the total liability for future benefits, total liability for accrued benefits (including the provision for conditional benefits until the next valuation report is filed), the current service cost and the present value of future contributions. For the purposes of the illustration, we have not changed the interest rate used to determine commuted values upon termination of employment.

SCENARIO (000'S)	VALUATION BASIS	REDUCE DISCOUNT RATE BY 1%
Total liability for future benefits	$13,188,200	$15,581,800
Total liability for accrued benefits	$9,653,900	$10,987,700
Current Service Cost	$301,800	$370,200
Present value of future contributions		
• basic contributions	$3,876,200	$4,213,800
• supplemental contributions	$1,274,100	$1,362,300

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VALUATION RESULTS – HYPOTHETICAL WIND-UP

FINANCIAL POSITION

When conducting a hypothetical wind-up valuation, we determine the relationship between the respective values of the Plan's assets and its liabilities assuming the Plan is wound up and settled on the valuation date, assuming benefits are settled in accordance with the Act and under circumstances producing the maximum wind-up liabilities on the valuation date.

There are significant difficulties in establishing appropriate assumptions for purposes of conducting a wind-up valuation for this Plan due to the size of the liabilities expected to be settled through the purchase of annuities relative to the size of the Canadian group annuity market, and the contractual cost of living adjustments provided to these members on their benefits.

The estimated cost of purchasing annuities has been determined in accordance with the Canadian Institute of Actuaries' Educational Note: *Assumptions for Hypothetical Wind-Up and Solvency Valuations with Effective Dates on or after December 31, 2018*. The estimated cost is based on the cost of purchasing annuities of significantly smaller size that would not be affected by the capacity constraints of the Canadian group annuity market. The actual cost of setting the Plan benefits could differ, perhaps significantly, from the costs estimated on this basis.

The hypothetical wind-up financial position as of the valuation date, compared with that at the previous valuation, is as follows:

(000'S)	01.01.2019	01.01.2018
Assets		
Market value of assets	$10,817,600	$10,821,000
Termination expense provision	($20,000)	($20,000)
Wind-up assets	$10,797,600	$10,801,000
Present value of accrued benefits for:		
• Active members - DBprime	$6,142,000	$6,189,800
• Active members - DBplus	$1,900	$0
• Pensioners	$6,593,500	$6,429,100
• Survivors	$298,300	$289,700
• Deferred pensioners	$183,000	$167,400
• Terminations in progress	$7,900	$7,900
• Refunds	$1,000	$1,000
Total wind-up liability	$13,227,600	$13,084,900
Wind-up excess (shortfall)	($2,430,000)	($2,283,900)

The wind-up liabilities for active members as of January 1, 2019 reflect the Board's election to opt out of providing grow-in benefits pursuant to Section 74.1 of the Act.

WIND-UP INCREMENTAL COST

The wind-up incremental cost is an estimate of the present value of the projected change in the hypothetical wind-up liabilities from the valuation date until the next scheduled valuation date, adjusted for the benefit payments expected to be made in that period.

The hypothetical wind-up incremental cost determined in this valuation, compared with the corresponding value determined in the previous valuation, is as follows:

(000'S)	01.01.2019	01.01.2018
Number of years covered by report	3 years	3 years
Total hypothetical wind-up liabilities at the valuation date (A)	$13,227,600	$13,084,900
Present value of projected hypothetical wind-up liability at the next required valuation (including expected new entrants) plus benefit payments until the next required valuation (B)	$14,569,200	$14,471,100
Hypothetical wind-up incremental cost (B – A)	$1,368,600	$1,386,200

The incremental cost is not an appropriate measure of the contributions that would be required to maintain the financial position of the Plan on a hypothetical wind-up basis unchanged from the valuation date to the next required valuation date, if actual experience is exactly in accordance with the going concern valuation assumptions. This is because it does not reflect the fact that the expected return on plan assets (based on the going concern assumptions) is greater than the discount rate used to determine the hypothetical wind-up liabilities.

DISCOUNT RATE SENSITIVITY

The following table summarizes the effect on the hypothetical wind-up liabilities shown in this report of using a discount rate which is 1% lower than that used in the valuation:

SCENARIO (000'S)	VALUATION BASIS	REDUCE DISCOUNT RATE BY 1%
Total hypothetical wind-up liability	$13,227,600	$15,079,800

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VALUATION RESULTS – SOLVENCY

OVERVIEW

The Act also requires the financial position of the Plan to be determined on a solvency basis. The financial position on a solvency basis is determined in a similar manner to the Hypothetical Wind-up Basis, except for the following:

EXCEPTIONS	REFLECTED IN VALUATION BASED ON THE TERMS OF ENGAGEMENT
The circumstance under which the Plan is assumed to be wound up could differ for the solvency and hypothetical wind-up valuations.	The same circumstances were assumed for the solvency valuation as were assumed for the hypothetical wind-up valuation.
Certain benefits can be excluded from the solvency financial position. These include: (a) any escalated adjustment (e.g. indexing), (b) certain plant closure benefits, (c) certain permanent layoff benefits, (d) special allowances other than funded special allowances, (e) consent benefits other than funded consent benefits, (f) prospective benefit increases, (g) potential early retirement window benefit values, and (h) pension benefits and ancillary benefits payable under a qualifying annuity contract.	Indexing was excluded from the solvency liabilities shown in this valuation.
The financial position on the solvency basis needs to be adjusted for any Prior Year Credit Balance.	Not applicable.
The solvency financial position can be determined by smoothing assets and the solvency discount rate over a period of up to 5 years.	Smoothing was not used.
The benefit rate increases coming into effect after the valuation date can be reflected in the solvency valuation.	Not applicable.
Section 1.3.1(3) of the Regulations to the Act state that a valuation report prepared on certain pension plans, including the Plan with an effective date on or after December 31, 2010 may specify the solvency deficiency to be a stated amount (not to be less than zero)	The solvency deficiency has been specified to be zero.

FINANCIAL POSITION

The financial position on a solvency basis, compared with the corresponding figures from the previous valuation, is as follows:

(000'S)	01.01.2019	01.01.2018
Assets		
Market value of assets	$10,817,600	$10,821,000
Termination expense provision	($20,000)	($20,000)
Net assets	$10,797,600	$10,801,000
Total hypothetical wind-up liabilities	$13,227,600	$13,084,900
Value of excluded benefits	($1,503,300)	($1,600,100)
Liabilities on a solvency basis	$11,724,300	$11,484,800
Surplus (shortfall) on a market value basis	($926,700)	($683,800)
Solvency ratio	0.92	0.94
Transfer ratio	0.82	0.83

As permitted under Section 1.3.1(3) of the regulations to the *Pension Benefits Act (Ontario)*, the solvency deficiency may be specified to be a stated amount, not to be less than zero. Consequently, the solvency deficiency as at January 1, 2019 has been specified to be zero.

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MINIMUM FUNDING REQUIREMENTS

SCHEDULED CONTRIBUTIONS

Under DBprime, members and employers must contribute an amount equal to the sum of the following in 2019:

- 11.20% of pensionable earnings up to the YMPE, plus
- 14.80% of pensionable earnings in excess of the YMPE.

Consistent with the Plan's Funding Policy, the total scheduled DBprime member contribution rate consists of a 8.20%/11.80% basic contribution rate and a supplemental contribution rate of 3% of pensionable earnings.

Under DBplus, the level of fixed contribution rates can vary by employer and member group as stipulated in the Plan provisions, not to exceed 9% of pensionable earnings. There are no supplemental contributions required under DBplus. Employer contributions to DBplus are equal to member contributions.

Note that contributions are being phased-in for certain participating employers who have joined either DBprime or DBplus. This results in members having lower contribution rates than employers for a fixed period of time.

The table below summarizes the estimated total contributions (by members and employers) for the year, in comparison to the estimated total contributions as of the last valuation:

(000'S)	2019	2018
Members' contributions - DBprime	$213,800	$230,200
Members' contributions - DBplus	$25,000	$0
Employers' contributions – DBprime	$214,300	$230,500
Employers' contributions - DBplus	$25,000	$0
Total contributions	$478,100	$460,700
DBprime payroll for year (excludes LTD's)[1]	$1,710,700	$1,845,800
DBplus payroll for year (excludes LTD's)[1]	$293,100	N/A
Total payroll for year (excludes LTD's)[1]	$2,003,800	$1,845,800
Contributions as a % of payroll – DBprime	25.02%	24.96%
Contributions as a % of payroll – DBplus	17.06%	N/A
Total contributions as a % of total payroll	23.86%	24.96%

[1] Annual member pensionable earnings capped at maximum allowable for accruing benefits in the Plan under the Income Tax Act.

As illustrated in Section 2, the Plan is fully funded on a going-concern basis under the Current Valuation. In addition, the solvency deficiency has been specified to be zero. Consequently, no additional special payments are required to be made in addition to the scheduled contributions.

The *Act* prescribes the minimum contributions that members and employers must make to the Plan. The minimum contributions in respect of a defined benefit component of a pension plan are comprised of going concern current service cost and special payments to fund any going concern or solvency shortfalls. However, as at January 1, 2018, an amendment to the Regulations to the *Pension Benefits Act (Ontario)* made permanent the temporary exemption for plans named in Section 47.7.1 of the Regulations from requiring scheduled contributions to meet minimum contribution requirements determined by the Reference Valuation.

In our opinion, the contributions being made to the Plan are sufficient to meet the requirements of the *Act*.

OTHER CONSIDERATIONS

Differences Between Valuation Bases

There is no provision in the Plan's scheduled contributions to fund the hypothetical wind-up deficit. Consequently, the Plan is likely to remain under-funded on a wind-up basis unless there are strong investment returns and/or significant increases in long-term nominal and real interest rates.

Payment of Benefits

The Act imposes certain restrictions on the payment of lump sums from the Plan when the transfer ratio revealed in an actuarial valuation is less than one. If the transfer ratio shown in this report is less than one, the plan administrator should ensure that the monthly special payments are sufficient to meet the requirements of the Act to allow for the full payment of benefits, and otherwise should take the prescribed actions.

Additional restrictions are imposed when:

- The transfer ratio revealed in the most recently filed actuarial valuation is less than one and the administrator knows or 'ought to know' that the transfer ratio of the Plan has declined by 10% or more since the date the last valuation was filed.

- The transfer ratio revealed in the most recently filed actuarial valuation is greater than or equal to one and the administrator knows or 'ought to know' that the transfer ratio of the Plan has declined to less than 0.9 since the date the last valuation was filed.

As such, the administrator should monitor the transfer ratio of the Plan and, if necessary, take the prescribed actions.

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ACTUARIAL OPINION

In our opinion, for the purposes of the valuations,

- The membership data on which the valuation is based are sufficient and reliable.
- The assumptions are appropriate.
- The methods employed in the valuation are appropriate.

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 *Pension Benefits Act (Ontario)* and Regulations.

Manuel Monteiro
Fellow of the Society of Actuaries
Fellow of the Canadian Institute of Actuaries

March 29, 2019

Date

Bill Watson
Fellow of the Society of Actuaries
Fellow of the Canadian Institute of Actuaries

March 29, 2019

Date

APPENDIX A

PRESCRIBED DISCLOSURE

DEFINITIONS

The Act defines a number of terms as follows:

DEFINED TERM	DESCRIPTION	RESULT
Transfer Ratio	The ratio of: (a) Solvency Assets minus the lesser of the Prior Year Credit Balance and the minimum required employer contributions until the next required valuation; to (b) the sum of the Solvency Liabilities and liabilities for benefits, other than benefits payable under qualifying annuity contracts that were excluded in calculating the Solvency Liabilities.	0.82
Prior Year Credit Balance	Accumulated excess of contributions made to the pension plan in excess of the minimum required contributions (note: only applies if the Company chooses to treat the excess contributions as a Prior Year Credit Balance).	$0
Solvency Assets (000’s)	Market value of assets including accrued or receivable income and excluding the value of any qualifying annuity contracts.	$10,817,600
Solvency Asset Adjustment	The sum of:	
	(a) the difference between smoothed value of assets and the market value of assets	$0
	(b) the present value of going concern special payments (including those identified in this report) within 6 years following the valuation date	$0
	(c) the present value of any previously scheduled solvency special payments (excluding those identified in this report)	$0
	(d) the face value of the letter of credit	$0
		$0

DEFINED TERM	DESCRIPTION	RESULT
Solvency Liabilities (000's)	Liabilities determined as if the plan had been wound up on the valuation date, including liabilities for plant closure benefits or permanent layoff benefits that would be immediately payable if the employer's business were discontinued on the valuation date of the report, but, if elected by the plan sponsor, excluding liabilities for, (a) any escalated adjustment, (b) excluded plant closure benefits, (c) excluded permanent layoff benefits, (d) special allowances other than funded special allowances, (e) consent benefits other than funded consent benefits, (f) prospective benefit increases, (g) potential early retirement window benefit values, and (h) pension benefits and ancillary benefits payable under a qualifying annuity contract.	$11,724,300
Solvency Liability Adjustment	The amount by which Solvency Liabilities are adjusted as a result of using a solvency valuation interest rate that is the average of market interest rates calculated over the period of time used in the determination of the smoothed value of assets.	$0
Solvency Deficiency (000's)	The amount, if any, by which the sum of:	
	(a) the Solvency Liabilities	$11,724,300
	(b) the Solvency Liability Adjustment	$0
	(c) the Prior Year Credit Balance	$0
		$11,724,300
	Exceeds the sum of	
	(d) the Solvency Assets net of estimated termination expenses[2]	$10,797,600
	(e) the Solvency Asset Adjustment	$0
		$10,797,600
	(f)	$926,700
	In accordance with Section 1.3.1(3) of the Regulations, the Solvency Deficiency can be specified to be an amount less than (f) above, not to be less than zero	The solvency deficiency has been specified to be $0

[2] In accordance with accepted actuarial practice, for purposes of determining the financial position, the market value of plan assets was reduced by a provision for estimated termination expenses payable from the Plan's assets that may reasonably be expected to be incurred in terminating the Plan and to be charged to the Plan.

TIMING OF NEXT REQUIRED VALUATION

In accordance with Section 14 of the regulations to the *Pension Benefits Act (Ontario),* the next valuation date of the Plan would be required as of no later than January 1, 2022, or as at the date of an earlier amendment to the Plan.

SPECIAL PAYMENTS – CURRENT VALUATION

Since there is no going-concern funding shortfall under the Current Valuation, no going-concern special payments are required. Also, since the solvency deficiency has been specified to be zero, no solvency special payments are required.

PENSION BENEFIT GUARANTEE FUND (PBGF) ASSESSMENT

In accordance with Section 37(1.1) of the regulations to the *Pension Benefits Act (Ontario)*, the Plan is not subject to assessment by the Pension Benefits Guarantee Fund.

APPENDIX B
PLAN ASSETS

The pension fund is held by the Plan. In preparing this report, we have relied upon the draft auditors' report for 2018 without further audit. Customarily, this information would not be verified by a plan's actuary. We have reviewed the information for internal consistency and we have no reason to doubt its substantial accuracy.

RECONCILIATION OF MARKET VALUE OF PLAN ASSETS

The pension fund transactions since the last valuation are summarized in the following table:

(000'S)	2018
January 1	$10,786,226[3]
PLUS	
Members' contributions	$235,221
Employers' contributions	$236,066
Service purchases	$12,105
Transfer from other pension plans	$12,045
Investment income	$40,102
	$535,539
LESS	
Pensions paid	$444,865
Lump-sums paid	$34,347
Transfer to other pension plans	$0
Administration and investment fees	$24,986
	$504,198
December 31	$10,817,567
Gross rate of return[4]	0.4%
Rate of return net of expenses[4]	0.1%

[3] The market value of Plan assets at January 1, 2018 was revised in the auditor's report following the filing of last year's actuarial valuation report. Therefore, the amount does not match the January 1, 2018 market value of assets in last year's actuarial valuation report nor Sections 2 - 4 of this report.

[4] Assuming mid-period cash flows.

We have tested the pensions paid, the lump-sums paid, and the contributions for consistency with the membership data for the Plan members who have received benefits or made contributions. The results of these tests were satisfactory.

INVESTMENT POLICY

The plan administrator has adopted a statement of investment policy and procedures. This policy is intended to provide guidelines for the managers as to the level of risk that is consistent with the Plan's investment objectives. A significant component of this investment policy is the asset mix.

The plan administrator is solely responsible for selecting the plan's investment policies, asset allocations, and individual investments. The constraints on the asset mix and the actual asset mix at the valuation date are provided for information purposes:

	INVESTMENT POLICY			ACTUAL ASSET MIX AS AT DECEMBER 31, 2018
	Minimum	Target	Maximum	
Global Developed Equity	20.0%	27.0%	35.0%	33.4%
Emerging Market Equities	8.0%	10.0%	12.0%	9.9%
Private Equities	5.0%	15.0%	20.0%	8.8%
Commodities	3.0%	5.0%	7.0%	4.7%
Infrastructure Real Estate	10.0%	20.0%	25.0%	17.0%
Nominal Long Bonds	10.0%	13.0%	25.0%	16.1%
Nominal Universe Bonds	3.0%	5.0%	7.0%	5.2%
Real Return Bonds	3.0%	5.0%	7.0%	4.8%
Cash and Cash Equivalents	0.0%	0.0%	0.0%	0.1%
		100.0%		100.0%

APPENDIX C

METHODS AND ASSUMPTIONS – GOING CONCERN

DETERMINING THE JANUARY 1, 2019 LIABILITIES

The effective date of the data at this valuation is December 31, 2017 (one year prior to the valuation date). In determining the actuarial liabilities as at January 1, 2019, we first calculated the actuarial liabilities as at January 1, 2018, and then projected the liabilities to January 1, 2019. The one year projection reflected any known as well as anticipated experience during 2018 with respect to benefit payments, contributions, and YMPE growth and inflation. We assumed that salary growth would be consistent with the last valuation assumption. For active DBprime and DBplus members on LTD we reflected the deemed salary increases. We also compared the actual termination and retirement experience with what was expected based on our decrement rates. However, the difference was not significant enough to require special adjustments in the projection. For purposes of this valuation, we believe that this projection process produces results that are within acceptable tolerances from the results that would have been determined using actual membership data (at December 31, 2018).

For this valuation, we have made an adjustment to reflect the future service impact of Torstar Corporation employees who were participating in a DB plan joining DBplus effective October 1, 2018.

VALUATION OF ASSETS

For this valuation, we have continued to use an adjusted market value method for purposes of determining the actuarial value of the plan assets, whereby investment gains and losses relative to the discount rate are recognized on a linear basis over five years.

The table below shows the calculation of the gain/(loss) on assets under the smoothing approach:

($000)	2015	2016	2017	2018
Market value of assets at beginning of year	$7,964,803	$8,592,301	$9,388,227	$10,786,226[5]
Net cash flows in the year	$25,757	$117,680	($12,369)	$16,225
Expected return on assets	$462,706	$493,115	$525,394	$604,483
Expected value of assets at end of year	$8,453,266	$9,203,096	$9,901,252	$11,406,934
Actual value of assets at end of year	$8,592,301	$9,388,227	$10,786,226[5]	$10,817,567
Gain/(loss)	$139,035	$185,131	$884,974	($589,367)
Liability discount rate at the beginning of the year	5.8%	5.7%	5.6%	5.6%

The smoothed value of the assets at January 1, 2019, was derived as follows:

($000)		
Market value of assets		$10,817,567
LESS		
Total Investment Gain/(Loss)	2015: $139,035 x 20% =	$27,807
	2016: $185,131 x 40% =	$74,052
	2017: $884,974 x 60% =	$530,984
	2018: ($589,367) x 80% =	($471,493)
		$161,350
Smoothed value of assets		$10,656,217

The asset values produced by this method are related to the market value of the assets, with the advantage that, over time, the market-related asset values will tend to be more stable than market values. To the extent that more investment gains than losses will arise over the long term, the smoothed value will tend to be lower than the market value.

[5] The market value of Plan assets at January 1, 2018 was revised in the auditor's report following the filing of last year's actuarial valuation report. Therefore, the amount does not match the January 1, 2018 market value of assets in last year's actuarial valuation report nor Sections 2 - 4 of this report.

CURRENT VALUATION

For purposes of the Current Valuation, we have continued to use the modified aggregate actuarial cost method. Under this method, the funding target is determined as the present value of benefit cash flows expected to be paid in respect of service accrued prior to the valuation date, plus service expected to accrue to currently active members in the future, based on projected earnings.

The funding excess or funding shortfall, as the case may be, is the difference between the market or smoothed value of assets plus the present value of contributions expected to be made by employers and members and the funding target. A funding excess indicates that the value of assets and expected contributions and investment earnings are expected to be sufficient to meet the cash flows in respect of benefits accrued to the valuation date and after the valuation date, as well as expected expenses – assuming the Plan is maintained indefinitely. A funding shortfall on a market value basis indicates the opposite – that the current market value of the assets and expected contributions is not expected to be sufficient to meet the Plan’s cash flow requirements in respect of accrued and future benefits, absent additional contributions.

As required under the Act, a funding shortfall must be amortized over no more than 15 years through special payments. A funding excess may, from an actuarial standpoint, be applied immediately to reduce required employer and member contributions unless precluded by the terms of the Plan or by legislation.

This method does not produce a normal cost in the usual sense. Rather, it determines whether or not the contributions expected to be made in the future by the members and the employers together with the assets of the Plan and investment income thereon are expected to be sufficient to meet the obligations of the Plan.

The present value of future basic contributions has been determined on a closed group basis. The present value of future supplemental contributions has been determined on an open group basis over a 15 year period.

The *funding excess* or *unfunded liability*, as the case may be, is the difference between the actuarial value of assets and the actuarial liability.

Reference Valuation

For purposes of the Reference Valuation, we have continued to use the projected unit credit actuarial cost method. Under this method, the funding target is determined as the present value of benefit cash flows expected to be paid in respect of service accrued prior to the valuation date, based on projected earnings. For each individual Plan member, accumulated contributions with interest are established as a minimum actuarial liability.

The projected unit credit actuarial cost method used for the purposes of the Reference Valuation produces a reasonable matching of contributions with accruing benefits. Because benefits are recognized as they accrue, the actuarial cost method provides an effective funding target for a plan that is maintained indefinitely.

Under the Reference Valuation, the current service cost is the present value of projected benefits to be paid under the Plan with respect to service expected to accrue during the period until the next valuation.

Under the projected unit credit actuarial cost method, the current service cost for an individual member will increase each year as the member approaches retirement. However, the current service cost of the entire group, expressed as a percentage of the members' pensionable earnings, can be expected to remain stable as long as the average age of the group remains constant.

ACTUARIAL ASSUMPTIONS – GOING CONCERN BASIS

The present value of future benefit payment cash flows is based on economic and demographic assumptions. At each valuation we determine whether, in our opinion, the actuarial assumptions are still appropriate for the purposes of the valuation, and we revise them, if necessary. Emerging experience will result in gains or losses that will be revealed and considered in future actuarial valuations.

The table below shows the various assumptions used in the current valuation in comparison with those used in the previous valuation.

ASSUMPTION	CURRENT VALUATION	PREVIOUS VALUATION
Discount rate:	5.50%	5.60%
Inflation:	2.00%	2.00%
ITA limit / YMPE / AIW increases:	3.00%	3.00%
Pensionable earnings increases:	3.75%	3.75%
Indexation (75% of CPI):	1.50%	1.50%
Interest on member contributions:	2.20%	2.30%
Retirement rates (active members):	4.9% per year prior to unreduced age, 14.8% per year on or after unreduced age, revised age-related table at ages 65 to 71 (see below)	4.9% per year prior to unreduced age, 14.8% per year on or after unreduced age, revised age-related table at ages 65 to 71 (see below)
Retirement rates (deferred members)	Age 55	Age 55
Retirement rates (LTD members)	Age 65	Age 65
Termination rates:	Service-based table (see below)	Service-based table (see below)
Proportion of terminating members electing a lump sum	80%	80%
Basis used to determine lump sums	<u>Mortality rates</u> CPM2014 mortality table with projection scale CPM-B <u>Non-indexed interest rates</u> 2.8% per year for 10 years, 3.2% per year thereafter <u>Partially indexed interest rates</u> 1.9% per year for 10 years, 2.1% per year thereafter	<u>Mortality rates</u> CPM2014 mortality table with projection scale CPM-B <u>Non-indexed interest rates</u> 2.8% per year for 10 years, 3.3% per year thereafter <u>Partially indexed interest rates</u> 1.7% per year for 10 years, 1.9% per year thereafter

ASSUMPTION	CURRENT VALUATION	PREVIOUS VALUATION
Mortality rates at valuation date:	Pre-Retirement 55% of the rates of the 2014 Public Sector Canadian Pensioners Mortality Table (CPM2014Publ) Post-Retirement 105% of the rates of the 2014 Public Sector Canadian Pensioners Mortality Table (CPM2014Publ)	Pre-Retirement 55% of the rates of the 2014 Public Sector Canadian Pensioners Mortality Table (CPM2014Publ) Post-Retirement 105% of the rates of the 2014 Public Sector Canadian Pensioners Mortality Table (CPM2014Publ)
Future mortality improvements:	Fully generational using Scale CPM-B	Fully generational using Scale CPM-B
Disability rates:	None	None
Eligible spouse at retirement:	85% of male members and 65% of female members	85% of male members and 65% of female members
Spousal age difference:	Male 3 years older	Male 3 years older
Rate of part-time service accrual	Assume same rate of service accrual as previous year	Assume same rate of service accrual as previous year

The assumptions are best-estimates and do not include a margin for adverse deviations.

RETIREMENT RATES

Retirement rates on or after age 65 are summarized in the following table:

AGE	RATE
65	35%
66	17%
67	17%
68	17%
69	30%
70	50%
71	100%

TERMINATION RATES

Sample rates from the termination assumption are as follows:

SERVICE	RATE
< 1	5.90%
1	5.15%
2	4.30%
3	3.70%
4	3.20%
5	2.70%
6	2.30%
7	2.00%
8	1.80%
9	1.65%
10	1.55%
11	1.50%
12	1.40%
13	1.30%
14	1.20%
15	1.10%
16	1.05%
17-29	1.00%
30+	0.00%

Pensionable Earnings

The benefits ultimately paid will depend on each member’s final average earnings. To calculate the pension benefits payable upon retirement, death or termination of employment, we have taken 2017 earnings and assumed that such pensionable earnings will increase at the assumed rate.

RATIONALE FOR ASSUMPTIONS

A rationale for each of the assumptions used in the current valuation is provided below.

DISCOUNT RATE

We have discounted the expected benefit payment cash flows using the expected investment return on Plan assets. Other bases for discounting the expected benefit payment cash flows may be appropriate, particularly for purposes other than those specifically identified in this valuation report.

The discount rate is comprised of the following:

- The actuary's best estimate of the long-term expected return on Plan assets reduced by:
- An implicit provision for expenses determined as the average rate of investment and administrative expenses paid from the fund over the last three years.

The discount rate was developed as follows:

Gross expected return on Plan assets	5.90%
Implicit provision for expenses	(0.40%)
Margin for adverse deviation	0.00%
Net discount rate	5.50%

The long-term expected return on Plan assets was derived based on our best estimate of expected returns for each of the major asset classes based on market conditions at the valuation date and the target asset mix specified in the Plan's investment policy.

The Board has established a detailed funding policy that describes how contributions and benefits (including indexation) should be adjusted, depending on the financial position of the Plan. The funding policy also describes the amount of funding reserves to be held, again depending on the financial position of the Plan.

The Plan is currently in a surplus position on a going-concern basis. Consistent with the funding policy, the Board has chosen to notionally allocate the entire surplus under the Plan as a funding reserve, rather than explicitly reducing the discount rate by a margin for adverse deviations.

INFLATION

The inflation assumption is based on the mid-point of the Bank of Canada's inflation target range of between 1% and 3%.

INCOME TAX ACT PENSION LIMIT, YEAR'S MAXIMUM PENSIONABLE EARNINGS AND AVERAGE INDUSTRIAL WAGE INCREASES

The assumption is based on the historical average productivity over the last 40 years of 1% per year and the underlying inflation assumption.

PENSIONABLE EARNINGS

The assumption is based on general wage growth assumptions increased by our best estimate of future merit and promotional increases over general wage growth considering industry averages.

INDEXING

The assumption is based on the Plan formula and inflation assumption above.

RETIREMENT RATES

The assumption is based on experience over the years 2008 to 2013. LTD members are assumed to retire at age 65.

TERMINATION RATES

The assumption is based on experience over the years 2008 to 2013.

MORTALITY RATES

The assumption is based on experience over the years 2008 to 2013.

Based on the assumption used, the life expectancy of a retired member age 65 at the valuation date is 22.6 years for males and 24.4 years for females.

FUTURE MORTALITY IMPROVEMENTS

There is broad consensus among actuaries and other longevity experts that mortality improvement will continue in the future, but the degree of future mortality improvement is uncertain. Two mortality improvement scales were recently published by the Canadian Institute of Actuaries (CIA) and may apply to Canadian pension valuations:

- The Canadian Pensioners Mortality (CPM) study published in February 2014 included CPM Improvement Scale B (CPM-B) which is also used for commuted value calculations.
- A report released by the Task Force on Mortality Improvement on September 20, 2017 includes an analysis of the rate of mortality improvement for the Canadian population and provides for mortality improvement scale MI-2017 to be considered for the purpose of reflecting future mortality improvement in Canadian actuarial work, while acknowledging that it might be appropriate to use alternative mortality improvement assumptions to reflect the nature of the work.

The CIA Committee on Pension Plan Financial Reporting published a revised version of the Educational Note on the Selection of Mortality Assumptions for Pension Plan Valuations on December 21, 2017. The Educational Note indicates that given the recent publication of the CPM-B and MI-2017 improvement scales and the similar data sets used in their development, it may be appropriate to use either scale in the absence of credible information to the contrary, such as the publication of a successor scale by the CIA.

For the present valuation, we have continued to use the CPM-B scale, which is a reasonable outlook for future mortality improvement.

INTEREST ON MEMBER CONTRIBUTIONS

The assumption is based on Plan terms and the Government of Canada long bond yields.

DISABILITY RATES

Use of a different assumption would not have a material impact on the valuation.

ELIGIBLE SPOUSE

The assumption is based on an industry standard for non-retired members. For retired members, the actual marital status is used.

SPOUSAL AGE DIFFERENCE

The assumption is based on an industry standard showing males are typically 3 years older than their spouse.

PROPORTION OF TERMINATING MEMBERS ELECTING A LUMP SUM AND BASIS USED TO DETERMINE LUMP SUMS

The percentage of terminating active members assumed to elect a lump sum is based on experience over the years 2007 to 2012.

The cost of future lump sums will depend on the level of market interest rates at the time the lump sum is paid and any changes in the applicable actuarial standards for the determination of pension plan commuted values. The assumed cost of future lump sums is based on the average expected level of market interest rates over the period during which lump sums are expected to be paid, taking into account market conditions on the valuation date.

APPENDIX D

METHODS AND ASSUMPTIONS – HYPOTHETICAL WIND-UP AND SOLVENCY

The hypothetical wind-up and solvency liabilities at January 1, 2019 were determined based on a projection of a valuation performed using membership data as of December 31, 2017. Please refer to Appendix C for a description of the methodology.

HYPOTHETICAL WIND-UP BASIS

The Canadian Institute of Actuaries requires actuaries to report the financial position of a pension plan on the assumption that the plan is wound-up on the effective date of the valuation, with benefits determined on the assumption that the pension plan has neither a surplus nor a deficit. For the purposes of the hypothetical wind-up valuation, the plan wind-up is assumed to occur in circumstances that maximize the actuarial liability.

To determine the actuarial liability on the hypothetical wind-up basis, we have valued those benefits that would have been paid had the Plan been wound up on the valuation date, with all members fully vested in their accrued benefits.

No benefits payable on plan wind-up were excluded from our calculations.

Upon Plan wind-up, members are given options for the method of settling their benefit entitlements. The options vary by eligibility, but in general, involve either a lump sum transfer or an immediate or deferred pension.

The value of benefits assumed to be settled through a lump sum transfer is based on the assumptions described in Section 3500 – Pension Commuted Values of the Canadian Institute of Actuaries' Standards of Practice applicable for January 1, 2019.

Benefits provided as an immediate or deferred pension are assumed to be settled through the purchase of annuities based on an estimate of the cost of purchasing annuities.

However, there is virtually no data available to provide credible guidance on the cost of a purchase of indexed annuities or annuities for a plan of this size in Canada. The estimated cost of purchasing annuities has been determined in accordance with the Canadian Institute of Actuaries' Educational Note: *Assumptions for Hypothetical Wind-Up and Solvency Valuations with Effective Dates on or after December 31, 2018*. The estimated cost is based on the cost of purchasing annuities of significantly smaller size that would not be affected by the capacity constraints of the Canadian group annuity market. The actual cost of setting the Plan benefits could differ, perhaps significantly, from the costs estimated on this basis.

We have not included a margin for adverse deviation in the solvency and hypothetical wind-up valuations.

The assumptions are as follows:

Form of Benefit Settlement Elected by Member	
Lump sum	70% of active members under age 55, and 40% of active members over age 55, elect to receive their benefit entitlement in a lump sum
Annuity purchase	All remaining members are assumed to elect to receive their benefit entitlement in the form of a deferred or immediate pension. These benefits are assumed to be settled through the purchase of deferred or immediate annuities from a life insurance company.
Basis for Benefits Assumed to be Settled through a Lump Sum	
Mortality rates:	100% of the rates of the 2014 Canadian Pensioners Mortality Table (CPM2014) with fully generational improvements using CPM Scale B
Interest rate:	2.8% per year for 10 years, 3.2% per year thereafter
Partially indexed interest rates:	1.9% per year for 10 years, 2.1% per year thereafter
Basis for Benefits Assumed to be Settled through the Purchase of an Annuity	
Mortality rates:	100% of the rates of the 2014 Canadian Pensioners Mortality Table (CPM2014) with fully generational improvements using CPM Scale B
Adjustment to mortality rates:	No adjustment
Interest rate:	3.23% per year based on a duration of 11.0 years determined for the liabilities assumed to be settled through the purchase of an annuity.
Partially indexed interest rate:	0.87% per year based on a duration of 11.0 years determined for the liabilities assumed to be settled through the purchase of an annuity
Retirement Age	
Maximum value:	Members are assumed to retire at the age which maximizes the value of their entitlement from the Plan based on the eligibility requirements which have been met at the valuation date
Grow-in:	Grow-in benefits have not been valued, as an election has been made to exclude grow-in benefits for members of the Plan, as permitted for jointly sponsored pension plans per Section 74.1 of the Act
Other Assumptions	
Final average earnings:	Based on actual pensionable earnings over the averaging period
Family composition:	Same as for going concern valuation
Maximum pension limit:	$3,025.56 per year
Termination expenses:	$20,000,000

To determine the hypothetical wind-up position of the Plan, a provision has been made for estimated termination expenses payable from the Plan's assets in respect of actuarial and administration expenses that may reasonably be expected to be incurred in terminating the Plan and to be charged to the Plan.

Because the settlement of all benefits on wind-up is assumed to occur on the valuation date and is assumed to be uncontested, the provision for termination expenses does not include custodial, investment management, auditing, consulting and legal expenses that would be incurred between the wind-up date and the settlement date or due to the terms of a wind-up being contested. Expenses associated with the distribution of any surplus assets that might arise on an actual wind-up are also not included in the estimated termination expense provisions.

In determining the provision for termination expenses payable from the Plan's assets, we have assumed that the Plan sponsors would be solvent on the wind-up date. We have also assumed, without analysis, that the Plan's terms as well as applicable legislation and court decisions would permit the relevant expenses to be paid from the Plan.

Actual fees incurred on an actual Plan wind-up may differ materially from the estimates disclosed in this report.

INCREMENTAL COST

In order to determine the incremental cost, we estimate the hypothetical wind-up liabilities at the next valuation date. We have assumed that the cost of settling benefits by way of a lump sum or purchasing annuities remains consistent with the assumptions described above. Since the projected hypothetical wind-up liabilities will depend on the membership in the Plan at the next valuation date, we must make assumptions about how the Plan membership will evolve over the period until the next valuation.

We have assumed that the Plan membership will evolve in a manner consistent with the going concern assumptions as follows:

- Members terminate, retire and die consistent with the termination, retirement and mortality rates used for the going concern valuation.
- Pensionable earnings, the Income Tax Act pension limit and the Year's Maximum Pensionable Earnings increase in accordance with the related going concern assumptions.
- Active members accrue pensionable service in accordance with the terms of the Plan.
- To accommodate for new entrants to the Plan, we have added to the projected liability an amount equal to the liability of new entrants that have joined the Plan since the previous valuation. For each active member whose membership is assumed to terminate, we have assumed a new active member joins the Plan. The demographics and earnings of the new entrants are consistent with the new entrants hired over the past year.

- Cost of living adjustments are consistent with the inflation assumption used for the going concern valuation.

SOLVENCY BASIS

In determining the financial position of the Plan on the solvency basis, we have excluded the value of escalated adjustments from the solvency liabilities.

The solvency position is determined in accordance with the requirements of the Act.

APPENDIX E
MEMBERSHIP DATA

ANALYSIS OF MEMBERSHIP DATA

The actuarial valuation is based on membership data as at December 31, 2017 (one year prior to the valuation date), provided by The Colleges of Applied Arts and Technology Pension Plan.

We have applied tests for internal consistency, as well as for consistency with the data used for the previous valuation. These tests were applied to membership reconciliation, basic information (date of birth, date of hire, date of membership, gender, etc.), pensionable earnings, credited service, contributions accumulated with interest, and pensions to retirees and other members entitled to a deferred pension. Contributions, lump sum payments, and pensions to retirees were compared with corresponding amounts reported in financial statements. The results of these tests were satisfactory.

If the data supplied are not sufficient and reliable for its intended purpose, the results of our calculation may differ significantly from the results that would be obtained with such data. Although Mercer has reviewed the suitability of the data for its intended use in accordance with accepted actuarial practice in Canada, Mercer has not verified or audited any of the data or information provided.

Plan membership data are summarized below. For comparison, we have also summarized corresponding data from the previous valuation.

	31.12.2017[6]	31.12.2016
Active Members (including LTD) accruing benefits in DBprime as at the valuation date		
Number	19,516	26,379
Number of members on LTD	487	493
Percentage male	41%	40%
Average age	47.8	47.7
Average pensionable service (with buyback service)	11.2 years	8.7 years
Total pensionable service (with buyback service)	217,691 years	229,185 years
Number with buyback service	4,152	4,344
Total buyback service	11,185 years	11,673 years
Total buyback contributions	$74,260,700	$73,243,900
Average annual salary	$83,825	$78,174
Total regular contributions with interest	$1,717,657,700	$1,725,877,800
Active OTRFT Members (including LTD) accruing benefits in DBplus as at the valuation date		
Number	7,270	0
Number of members on LTD	1	0
Percentage male	39%	N/A
Average age	47.4	N/A
Average pensionable service (with buyback service)	1.8 years	N/A
Total pensionable service (with buyback service)	13,196 years	N/A
Number with buyback service	152	N/A
Total buyback service	334 years	N/A
Total buyback contributions	$1,152,700	N/A
Average annual salary	$68,955	N/A
Total regular contributions with interest	$99,208,200	N/A
Active Design Two Members (Torstar DB)		
Number	894	0
Percentage male	53%	N/A
Average age	53.1	N/A
Average pensionable service[7]	19.3 years	N/A
Average annual salary	$73,180	N/A

[6] October 1, 2018 for Torstar DB Plans

[7] Includes past service in Torstar DB Plans

	31.12.2017[6]	31.12.2016
Deferred Pensioners		
Number	3,717	3,073
Percentage male	40%	40%
Average age	45.7	46.6
Average annual pension	$3,600	$3,900
Average bridge pension	$1,100	$1,200
Terminations in progress[8]		
Number	421	386
Percentage male	43%	42%
Average age	55.4	56.7
Average annual lifetime pension	$2,600	$3,200
Average bridge pension	$600	$1,000
Total contributions with interest	$3,468,800	$3,700,700
Retired Members		
Number	13,786	13,278
Percentage male	46%	46%
Average age	72.1	72.0
Average annual lifetime pension payable	$28,200	$27,800
Average bridge pension	$8,100	$8,000
Number with bridge pension	2,439	2,387
Total pensions paid	$408,709,852	$388,624,540
Survivors		
Number	1,842	1,771
Percentage male	20%	20%
Average age	79.1	78.8
Average annual lifetime pension payable	$13,900	$13,500
Total pensions paid	$25,561,469	$23,922,965
Non-vested Refunds		
Number	150	153
Percentage male	53%	53%
Average age	58.3	57.1
Total contributions with interest	$904,593	$912,635

[8] "Termination in progress" refers to members who have ceased employment, received a statement of benefit, but have not yet made an election.

The membership movement for all categories of membership since the previous actuarial valuation is as follows:

	ACTIVES[9]	DEFERRED VESTED	RETIRED MEMBERS	SURVIVORS	TERMINATIONS IN PROGRESS	REFUNDS	TOTAL
Total at 31.12.2016	**26,379**	**3,073**	**13,278**	**1,771**	**386**	**153**	**45,040**
New entrants	2,731						2,731
Return to active	47	(38)	(3)		(5)	(1)	-
Terminations:							
• deferred pensions	(1,161)	1,181			(20)		-
• in progress	(214)	(29)			245	(2)	-
• paid out	(164)	(412)			(179)		(755)
Benefit Expired			(6)				(6)
Retirements	(787)	(46)	845		(12)		-
Deaths, no survivor	(28)	(7)	(157)	(109)	6		(295)
Deaths with survivor	(6)		(171)	177			-
Data Corrections	(11)	(5)		3			(13)
Total at 31.12.2017	**26,786**	**3,717**	**13,786**	**1,842**	**421**	**150**	**46,702**

[9] Excludes Torstar DB members who joined the Plan on October 1, 2018

The distribution of the active members by age and pensionable service as at the valuation date is summarized as follows:

	YEARS OF PENSIONABLE SERVICE								
Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-29**	**30-34**	**35+**	**Total**
< 25	227								227
	$41,518								$41,518
25-29	1,148	56							1,204
	$57,343	$59,517							$57,444
30-34	1,924	571	101						2,596
	$64,343	$67,582	$67,958						$65,196
35-39	1,849	798	474	60					3,181
	$68,294	$74,689	$75,191	$70,903					$70,975
40-44	1,677	801	655	349	21				3,503
	$72,955	$81,900	$82,364	$83,136	$88,476				$77,867
45-49	1,759	730	699	450	149	64	2		3,853
	$76,151	$88,187	$91,490	$91,025	$91,924	$77,850	$53,299		$83,578
50-54	1,559	785	789	582	240	356	133		4,444
	$76,646	$86,909	$92,928	$92,345	$91,028	$86,269	$82,237		$85,121
55-59	1,299	626	675	565	285	400	232	58	4,140
	$78,444	$88,051	$93,198	$94,792	$95,319	$90,395	$89,906	$72,149	$87,404
60-64	787	358	424	423	175	270	181	107	2,725
	$80,996	$90,835	$94,463	$94,532	$98,363	$89,155	$96,993	$85,098	$89,632
65-69	262	110	129	94	41	64	77	55	832
	$79,410	$91,112	$101,127	$94,550	$100,062	$100,251	$100,516	$109,913	$92,626
70 +	17	11	13	13	2	6	5	14	81
	$65,645	$78,589	$115,266	$89,925	$74,752	$92,576	$105,490	$108,340	$91,322
Total	**12,508**	**4,846**	**3,959**	**2,536**	**913**	**1,160**	**630**	**234**	**26,786**
	$71,049	**$82,181**	**$88,717**	**$91,315**	**$94,231**	**$88,703**	**$91,627**	**$89,111**	**$79,789**

The distribution of the inactive members by age as at the valuation date is summarized as follows:

	DEFERRED PENSIONERS		RETIRED MEMBERS		SURVIVORS	
Age	**Number**	**Average Pension**	**Number**	**Average Pension**	**Number**	**Average Pension**
< 30	327	$525			3	*
30 – 34	419	$1,418				
35 – 39	467	$2,421				
40 – 44	495	$3,315			7	$13,192
45 – 49	569	$4,045				
50 – 54	662	$5,211	64	$33,111	8	$14,228
55 – 59	415	$4,938	725	$30,147	31	$17,974
60 – 64	277	$6,180	1916	$32,725	74	$18,263
65 – 69	61	$5,184	3226	$31,240	170	$19,164
70 – 74	22	$3,905	3200	$30,191	273	$16,528
75 – 79	2	*	2263	$25,357	375	$14,453
80 – 84			1311	$22,205	369	$12,918
85 – 89			737	$18,352	338	$11,508
90 – 94	1	*	284	$14,317	157	$8,598
95 – 99			57	$12,832	35	$5,780
100+			3	$19,325	2	*
Total	**3,717**	**$3,642**	**13,786**	**$28,213**	**1,842**	**$13,877**

* Pension amounts are not displayed to preserve confidentiality

APPENDIX F

SUMMARY OF PLAN PROVISIONS

Mercer has used and relied on the plan documents, including amendments and interpretations of plan provisions, supplied by the Colleges of Applied Arts and Technology Pension Plan. If any plan provisions supplied are not accurate and complete, the results of any calculation may differ significantly from the results that would be obtained with accurate and complete information. Moreover, plan documents may be susceptible to different interpretations, each of which could be reasonable, and the results of estimates under each of the different interpretations could vary.

This valuation is based on the plan provisions in effect on January 1, 2019. Since the last valuation date, the Plan was amended to add “Design Two” provisions (also referred to as “DBplus”). The original provisions are referred to as “Design One” or “DBprime”.

Members who work part-time or on contract (referred to as “other than regular full-time” or “OTRFT”) began accruing future benefits under the Design Two provisions for service on and after January 1, 2019 (their past service benefits remain under Design One). In addition, new employers may choose to participate in Design One, Design Two or both.

The following is a summary of the main provisions of the Plan in effect on January 1, 2019. This summary is not intended as a complete description of the Plan.

The main provisions of Design One (DBprime) are as follows:

Background	The Plan became effective July 1, 1967. Benefits are based on a set formula and are paid for by the members and participating employers. The Plan is named in Section 47 of the Regulations to the Pension Benefits Act (Ontario) as a jointly sponsored pension plan.
Eligibility for Membership	A full-time employee must join the Plan upon employment. On or after January 1, 2019, only members who are full-time employees and who are not Design Two employees may accrue benefits under the Design One provisions.

Member Contributions	Members who contribute to the Canada Pension Plan are required to contribute an amount equal to the sum of the following: • 11.2% of pensionable earnings up to the YMPE; plus • 14.8% of pensionable earnings in excess of the YMPE. Contributions in respect of earnings above the earnings limit ($171,368 in 2019) are directed to the RCA. The earnings limit is the earnings level at which the pension accrued in the year (calculated based on current year earnings and YMPE only) is equal to the maximum pension limit ($3,025.56 in 2019). Members who are receiving benefits under a long term disability plan or are disabled under the Worker's Compensation Act are not required to contribute to the Plan.
Employer Contributions	The employers are required to match the member contributions.
Retirement Dates	Normal Retirement Date • The normal retirement date is the last day of the month coincident with or next following the member's 65th birthday. Early Retirement Date • A member may choose to retire early on the last day of the month coincident with or next following the earliest of – Age 55; – Age 50 with 20 years of credited service; or – Age plus years of credited service totalling 85 years.
Normal Retirement Pension	Basic Benefit 1.3% of the annualized average pensionable earnings for the 60 consecutive months for which they are the highest, up to the average of the YMPE during the last 5 calendar years PLUS 2.0% of the excess, if any, of the member's annualized average pensionable earnings for the 60 consecutive months for which they are the highest, in excess of the average of the YMPE during the last 5 calendar years MULTIPLIED BY The member's total years of credited service. Supplemental Benefit (payable to age 65) 0.7% of the annualized average pensionable earnings for the 60 consecutive months for which they are the highest, up to the average of the YMPE during the last 5 calendar years MULTIPLIED BY The member's total years of credited service.

Early Retirement Pension	If a member retires early, the member will be entitled to a pension that is calculated the same way as for a normal retirement. The basic pension and supplemental benefit payable, however, will be reduced by ¼% per month for each month that the member's early retirement precedes the earliest date on which the member would have attained the following if the member had continued employment to such date: • Age 65; • Age 60 with 20 years of credited service; or • Age plus years of credited service totalling 85 years.
Maximum Pension	The total annual pension payable from the Plan upon retirement, death or termination of employment cannot exceed the lesser of: • 2% of the average of the best three consecutive years of total compensation paid to the member by the employer, multiplied by years of credited service; and • The defined benefit limit under the Income Tax Act, multiplied by the member's years of credited service. The limit in respect of pre-1990 service credited after June 7, 1990 is 2/3rds of the defined benefit limit. The maximum pension is subject to minimum early retirement reductions as required under the Income Tax Act. The maximum pension is determined at the date of pension commencement.
Death Benefits	Pre-retirement: • If a member dies before the normal retirement date and before any pension payments have begun, the member's spouse, or beneficiary if there is no spouse, will receive a lump sum settlement equal to the value of the benefits to which the member would have been entitled had employment terminated on the date of death. If the deceased member has children under the age of 18 and does not have a spouse, 50% of the member's accrued pension shall be divided equally among the children under 18. The beneficiary or estate will then receive a lump sum settlement equal to the value of the benefits to which the member would have been entitled had employment terminated on the date of death, less the value of the children's benefits. Post retirement: • The normal form of payment is a lifetime pension. For a member with a qualifying spouse at death, the normal form is a joint and survivor 60% pension.
Termination Benefits	A deferred lifetime pension, based on the member's earnings and years of credited service up to the date of termination. Deferred pensions are payable commencing at age 65, subject to a 5% per annum reduction for commencement prior to age 65.

Pre-retirement and post-retirement indexation	Pensions in payment and deferred pensions in respect of service on or after January 1, 1992 but before January 1, 2008 are increased every January 1 at 75% of the increase in the Consumer Price Index, up to a maximum annual increase of 8%. Increases in excess of 8%, as well as decreases, are carried forward to future years. Pensions in payment and deferred pensions in respect of service prior to January 1, 1992 were increased in the same manner, with the last approved increase occurring on January 1, 2014. Pensions in payment and deferred pensions in respect of service on or after January 1, 2008 are contingent on the funded status of the Plan at the last filed valuation.

The main provisions of Design Two (DBplus) are as follows:

Background	The Plan was amended effective June 1, 2018 by adding the Design Two provisions. Effective June 1, 2018, the benefits, rights and obligations of Design Two employees shall be in accordance with the Design Two provisions. Effective January 1, 2019, the benefits, rights and obligations of Other Than Regular Full-time (“OTRFT”) employees shall be in accordance with the Design Two provisions.
Eligibility for Membership	An OTRFT employee may elect to join on or after their date of hire. OTFRT employees who were members of the Plan on December 31, 2018 will accrue benefits under the Design Two provisions for service on and after January 1, 2019. A Design Two full-time employee shall join on their date of hire (unless otherwise stated in the Plan provisions). OTRFT Design Two employees may elect to join on or after their date of hire (or effective date of employer participation if later).

Member Contributions	An OTRFT member shall contribute 9% of pensionable earnings. A Design Two member shall contribute 9% of pensionable earnings unless otherwise specified in the Plan text per their employer's agreement, provided that the contribution may not exceed 9% of pensionable earnings. Member contributions may not exceed the maximum amount that may be permitted for registered pension plans, as specified under Section 8503(4)(a) of the Regulations of the Income Tax Act. Members who are receiving benefits under a long term disability plan ("LTD") or are disabled under the Worker's Safety and Insurance Act ("WSIA) are not required to contribute to the Plan, but may elect to do so as follows: • WSIA – no contributions for the first 12 months (contributions credited based on deemed earnings), thereafter member may elect to contribute based on actual WSIA benefits (as opposed to deemed earnings) • LTD – member may elect to contribute based on actual LTD benefits (as opposed to deemed earnings)
Employer Contributions	The employers are required to match the member contributions. Employer contributions may exceed member contributions for a set period in accordance with the Plan provisions for that employer.
Retirement Dates	Normal Retirement Date • The normal retirement date is the last day of the month coincident with or next following the attainment of age 65. Early Retirement Date • A member may choose to retire early on the last day of the month coincident with or next following the attainment of age 50.
Normal Retirement Pension	Normal Retirement Pension = Base Benefit + AIW Benefit <u>Base Benefit</u> The product of 8.5% multiplied by the sum of member contributions and employer contributions remitted to the Plan under the Design Two provisions on behalf of that member. <u>AIW Benefit</u> AIW Benefit = AIW Adjusted Design Two Benefit – Base Benefit Where "AIW Adjusted Design Two Benefit" is the value of a member's Base Benefit adjusted by the increase in Average Industrial Wage which are contingent on the funded status of the Plan at the last filed valuation.

Early Retirement Pension	If a member retires early, the member will be entitled to a pension that is calculated the same way as for a normal retirement. The Base Benefit and AIW Benefit payable, however, will be reduced by 5% per year for each year and prorated for partial years that the member's early retirement precedes the Normal Retirement Date. For Early Retirement Dates before January 1, 2022, the Base Benefit and AIW Benefit payable will be reduced by 3% per year for each year and prorated for partial years that the member's early retirement precedes the Normal Retirement Date. The continuation of this lesser reduction is contingent on the funded status of the Plan at the last filed valuation.
Maximum Pension	The total annual pension payable from the Plan upon retirement, death or termination of employment cannot exceed the lesser of: • 2% of the average of the best three consecutive years of total compensation paid to the member by the employer, multiplied by years of credited service; and • The defined benefit limit under the Income Tax Act, multiplied by the member's years of credited service. The limit in respect of pre-1990 service credited after June 7, 1990 is 2/3rds of the defined benefit limit. The maximum pension is subject to minimum early retirement reductions as required under the Income Tax Act. The maximum pension is determined at the date of pension commencement.
Death Benefits	Pre-retirement: • If a member dies before the normal retirement date and before any pension payments have begun, the member's spouse, or beneficiary if there is no spouse, will receive a lump sum settlement equal to the value of the benefits to which the member would have been entitled had employment terminated on the date of death. If the deceased member has children under the age of 18 and does not have a spouse, 50% of the member's accrued pension shall be divided equally among the children under 18. The beneficiary or estate will then receive a lump sum settlement equal to the value of the benefits to which the member would have been entitled had employment terminated on the date of death, less the value of the children's benefits. Post retirement: • The normal form of payment is a lifetime pension. For a member with a qualifying spouse at death, the normal form is a joint and survivor 60% pension.
Termination Benefits	A deferred pension in the amount accrued to the member and payable at the member's Normal Retirement Date. Deferred pensions may commence on or after attainment of age 50 and will be reduced by 5% per year for each year and prorated for partial years that the member's early retirement precedes the Normal Retirement Date.

Pre-retirement and post-retirement indexation	Pensions in payment and deferred pensions in respect of Design Two benefits are contingent on the funded status of the Plan at the last filed valuation.

Former full-time ROM Plan members participate in Design One as of January 1, 2019. OTRFT ROM Plan members participate in Design Two effective January 1, 2019. The Plan provisions for the former ROM Plan members are the same as described above for Design One or Design Two as appropriate, except for the following:

Normal Retirement Pension	The normal retirement benefit for former ROM Plan members in respect of service before December 31, 2015 shall be equal to 1% for each year of credited service up to December 31, 1989, plus 1.3% for each year of credited service between January 1, 1990 and December 31, 2015, of the best average earnings up to, and 2.0% for each year of credited service of the best average earnings in excess of, the final average YMPE. Best average earnings is defined as the greater of the frozen best 3-year average earnings prior to January 1, 2010 and the best 5-year average earnings at the date of a determination.
Early Retirement Pension	Benefits for former ROM Plan members earned prior to January 1, 2010 are subject to a reduction of 2% for each of the first 5 years that early retirement precedes age 65 and 5% for each of the next 5 years. Benefits for former ROM Plan members earned after January 1, 2010 but before December 31, 2015 are subject to a 5% per year reduction from age 65.
Pre-retirement and post-retirement indexation	Pensions in payment and deferred pensions in respect of service prior to December 31, 2015 while a member of the ROM Plan are contingent on the funded status of the Plan at the last filed valuation.

APPENDIX G

PLAN ADMINISTRATOR CERTIFICATION

With respect to the Report on the Actuarial Valuation for Funding Purposes as at January 1, 2019 of The Colleges of Applied Arts and Technology Pension Plan, I hereby certify that, to the best of my knowledge and belief:

- The valuation reflects the terms of the Board's engagement with the actuary described in Section 1 of this report, particularly the requirement to not reflect a margin for adverse deviations in the going concern valuation.
- A copy of the official plan documents and of all amendments made up to January 1, 2019 was provided to the actuary and is reflected appropriately in the summary of plan provisions contained herein.
- The asset information summarized in Appendix B is reflective of the Plan's assets.
- The membership data provided to the actuary included a complete and accurate description of every person who is entitled to benefits under the terms of the Plan for service up to December 31, 2017.
- All events subsequent to January 1, 2019 that may have an impact on the Plan have been communicated to the actuary.

March 29, 2019

Date

Signed

Derek W. Dobson

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