



Actuarial Report on

**British Columbia College
Pension Plan**

Actuarial Valuation
as at August 31, 2015

Vancouver, British Columbia
May 12, 2016

Contents

Actuarial Report Highlights.....	3
I. Scope of the Valuation	10
II. Changes in Plan	12
III. Actuarial Methods and Assumptions	13
IV. Results of the Funding Valuation	19
V. Sustainable Indexing Valuation	31
VI. Subsequent Events	33
VII. Actuarial Opinion	33
VIII. Acknowledgement	33
Appendix A: Summary of Plan and Amendments as at August 31, 2015	34
Appendix B: Actuarial Methods and Assumptions	48
Appendix C: Active Member Data as at August 31, 2015.....	67
Appendix D: Inactive Member Data as at August 31, 2015.....	70
Appendix E: Pensioner Data as at August 31, 2015.....	72
Appendix F: Development of Required Contribution Rates.....	74
Appendix G: Comparative Results	76

Actuarial Report Highlights

BC College Pension Plan

August 31, 2015

An actuarial valuation of the College Pension Plan was completed as at August 31, 2015. Its purpose was to determine the financial (or actuarial) position of the Plan as at August 31, 2015 and to report on the adequacy of the member and employer contribution rates.

Scope of Valuation

Two primary valuations were carried out:

- **A Funding Valuation** - to determine the financial position of the Basic Account as at August 31, 2015 and to report on the adequacy of the member and employer contribution rates, and
- **A Sustainable Indexing Valuation** - to determine the rate of indexing that can be sustained in the long term, based on the financial position of the Basic Account and the Inflation Adjustment Account ("IAA"), and the overall level of contributions to the plan.

Furthermore, it ignores the limits imposed by the *Income Tax Act* ("ITA") on benefits provided from registered pension plans - such excess benefits are paid on a current cash basis through the Supplemental Benefits Account, which is maintained at a zero balance.

We have, however, performed supplementary valuations as follows:

- For basic and indexed benefits, on the assumption that indexed benefits are to be fully funded, in advance, as for basic benefits; and
- Limiting benefits to those permitted under the *ITA*; this is done both for basic benefits only, and for basic plus indexed benefits.

Key Plan Changes Included in the Valuation

- Effective September 1, 2013, member contribution rates to the Basic Account were increased to 8.22% of salary up to the Yearly Maximum Pensionable Earnings ("YMPE") and 8.97% on salary above the YMPE.
- Effective September 1, 2013, employer contribution rates to the Basic Account were increased to 8.32% of salary up to the YMPE and 9.07% on salary above the YMPE.

- Effective September 30, 2015, the plan rules were amended to ensure compliance with the enactment of the new PBSA and Regulation.
- Effective January 1, 2016, the plan rules were amended to implement plan design changes as follows:
 - to increase the pension accrual rate on earnings below the YMPE from 1.7% to 2% for pensionable service accrued after December 31, 2015;
 - to remove the integration of member and employer contribution rates with the YMPE as follows:
 - member contribution rates to the Basic Account were updated to a single rate of 8.39% of salary for earnings below and above the YMPE; and
 - employer contribution rates to the Basic Account were updated to a single rate of 8.49% of salary for earnings below and above the YMPE;
 - member and employer contribution rates to the Inflation Adjustment Account were increased from 1.38% to 1.47% of salary;
 - the early retirement reduction rate for service accrued after December 31, 2015 was amended to 3% per year below age 65 for all members, except for members who have reached age 55 and have at least 35 years of contributory service who continue to be entitled to an unreduced retirement benefit.
- Effective April 1, 2016, member and employer contribution rates to the Inflation Adjustment Account were increased to 1.57% of salary each.

There were no other benefit changes of material financial impact.

Actuarial Methods and Assumptions

The actuarial liabilities include the value of benefits accrued by members as at August 31, 2015, as well as future benefits expected to be earned by existing members. Asset values are based on smoothed market values (limited to not more than 108%, nor less than 92%, of market value), plus projected future contributions based on entry-age normal contribution rates and, where relevant, the existing amortization rates.

The contribution rates are tested on the entry-age contribution method. Under this method, a long-term entry-age rate, which would fully fund benefits for future new entrants to the Plan, is calculated. The surplus (unfunded liability) is then amortized according to the requirements of the funding policy of the Board. This approach is designed to maintain costs at a level percentage of payroll over an extended period. The

resulting contribution rate meets the going-concern requirements of the BC Pension Benefits Standards Act¹ (“PBSA”) as required by the Joint Trust Agreement.

Key Long-term Assumptions

Assumptions were set taking into account the funding policy of the Board. The Funding Valuation focuses on setting an appropriate level of contributions to ensure the security of benefits; accordingly, the economic assumptions require margins for adverse deviations. The Sustainable Indexing Valuation focuses on setting a level of indexing, given the contributions committed to the plan, which is equitable across generations. As a result this valuation has been carried out using best estimate assumptions for future investment returns and price inflation. The key long-term assumptions used include (assumptions for the previous valuation are in brackets).

	Funding Valuation	Sustainable Indexing Valuation
Annual Investment Return	6.25% (6.5%)	6.50% (6.75%)
Annual Salary Increase	3.5% (3.75%) plus seniority	3.25% (3.50%) plus seniority
Annual Indexing	0% for basic costs 2.75% (3.0%) for indexed costs	2.50% (2.75%) for fully indexed costs Sustainable level of indexing calculated as valuation output

¹ As the valuation date is prior to the September 30, 2015 effective date of the new PBSA, strictly speaking this valuation is carried out under the prior PBSA. From a practical perspective, the required minimum contribution rates are the same under both acts.

Funding Valuation Results

The funding valuation shows an improvement in the actuarial position of the Basic Account on the entry-age normal contribution basis. A surplus of \$154 million has emerged since the August 31, 2012 valuation:

Basic Benefits Only (\$000's)	2015	2012 (allowing for 2016 benefit changes)	2012 (prior to 2016 benefit changes)
Assets without previously scheduled amortization ¹	4,361,338	3,505,245	3,509,952
Liabilities	4,294,246	3,604,965	3,618,924
Surplus (Unfunded Liability) without previously established amortization	67,092	(99,720)	(108,972)
Present value of previously established amortization	87,226	99,720 ²	108,972 ²
Surplus (Unfunded Liability) with previously established amortization	154,318	0	0

The corresponding supplementary valuation results are:

Basic and Indexed Benefits (\$000's)	2015	2012 (prior to 2016 benefit changes)
Assets without previously scheduled amortization ¹	5,142,344	4,200,925
Liabilities	5,744,979	4,999,623
Surplus (Unfunded Liability) without previously established amortization	(602,635)	(798,698)
Present value of previously established amortization	87,226	108,972 ²
Surplus (Unfunded Liability) with previously established amortization	(515,409)	(689,726)

When the ITA maximums are recognized, the above funding valuation surpluses (unfunded liabilities) change marginally, to:

Benefits Limited to ITA Maximums: (\$000's)		2015	2012 (prior to 2016 benefit changes)
Surplus (Unfunded Liability) with previously established amortization	Basic Benefits only	163,092	8,410 ²
	Basic and Indexed Benefits	(504,076)	(677,501) ²

¹ This includes the present value of contributions at the entry age normal cost rate. The entry age normal cost changes when the benefits change. As a result, the present value of entry age normal cost contributions and the asset value change too.

² Including the present value of the amortization requirement established at the 2012 valuation, as amended following the introduction of the 2016 benefit changes, where relevant.

Main Reasons for Changes in Funding Valuation Actuarial Position

The main reasons for the improvement in the actuarial funding position are:

- Smoothed investment returns higher than assumed; and
- Actual salary increases lower than assumed;

Partially offset by

- Actual contributions lower than previously assumed;
- Changes in the demographic assumptions, most importantly changes in the mortality assumptions; and
- Changes in the economic assumptions.

Member and Employer Contribution Rates – Basic Non-Indexed Benefits

Members currently contribute 8.39% of salaries for basic non-indexed benefits; employers contribute 8.49% of salaries for a total level contribution rate of 16.88% of salaries. The long term cost for future service (i.e. the entry-age, normal actuarial cost) is 16.63% or 0.25% of salaries lower than the current combined member and employer contributions.

The Joint Trust Agreement ("JTA") requires that the contribution rates comply with the going-concern requirements of the *PBSA*. The funded position of the plan on the entry-age rate basis has improved to a surplus of \$154 million, including the present value of the 0.06% of pay until 2021 and 1.04% of pay until 2027 amortization requirements established at previous valuations, and after allowing for the 2016 benefit changes. Without this amortization requirement, the plan still has a surplus of \$67 million. However, as the *PBSA* only allows amortization of surplus in excess of 5% of the net liabilities, or \$164 million in this case, no amortization of the \$67 million surplus is permissible and so, as a minimum, contributions at the entry-age normal cost rate of 16.63% of salaries are required.

The JTA sets out four alternatives available to the Board when the plan has a surplus in the Basic Account:

- Reducing the contribution rate;
- Improving benefits;
- Making a transfer to the Inflation Adjustment Account;
- Setting aside a rate stabilization reserve.

If the contribution rate is reduced, the JTA requires that the decrease be shared equally between the members and the employers. Accordingly, the total contribution rate may decrease by 0.24% of salaries

(after rounding) (0.12% of salaries each for members and employers) for a minimum permissible Basic contribution rate of 16.64%, or the basic benefits may be increased such that the required contribution rate becomes equal to the current contribution of 16.88%, or the contribution rate can remain at 16.88% of pay and the surplus can be retained in the Basic Account as a rate stabilisation reserve, or transferred to the IAA. Variations that combine some, or all, of the alternatives are allowed by the JTA.

The funding policy indicates that the Board's priority is first to establish a rate stabilisation reserve, then ensure that the sustainable indexing level does not decline from its current level before taking any other action. If necessary a transfer from the Basic account to the IAA will be made sufficient to ensure this outcome. At this valuation such a transfer is not required. We would be happy to discuss alternatives with the Board.

Combined Minimum Permissible Basic plus IAA Contribution Rates

When the Basic contributions are combined with the existing IAA rates, the revised totals become:

	Member	Employer	Total
Basic Account (allowing for 2016 benefit changes)	8.39%	8.49%	16.88%
Minus maximum permissible Basic Account reduction	0.12%	0.12%	0.24%
Total Minimum Permissible Basic Rate	8.27%	8.37%	16.64%
Current IAA ¹	1.57%	1.57%	3.14%
Total Minimum Permissible Rate	9.84%	9.94%	19.78%

These minimum permissible contribution rates comply with the requirements of the provincial pension standards legislation (i.e. the *PBSA*).

The *ITA* requires that individual member contributions not exceed the lesser of 9% of salaries or \$1,000 plus 70% of the pension credit, though this condition may be waived by the Minister of Finance provided members do not contribute more than half the cost of benefits.

Both the current member contributions and the minimum permissible member contributions will exceed this limit, so regardless of the decision by the Board with respect to contribution rates, it will be necessary to apply to the Minister for a waiver. The employer contributions currently exceed the member contributions by 0.1% of salaries. As IAA contribution rates are fixed and any future Basic contribution rate changes must be shared equally in terms of the JTA, the requirement that the member contributions will not exceed half of the amount required to fund the aggregate benefits is met. The plan has applied for and been granted the waiver following the 2012 valuation.

¹ Effective April 1, 2016.

Sustainable Indexing Valuation

The Sustainable Indexing Valuation shows that, taking the minimum permissible Basic account contribution into account, indexing of 2.07% per year is sustainable in the long term. This is an increase from the sustainable indexing level of 1.83% established at the 2012 valuation.

The main reasons for the improvement in the sustainable indexing level are similar to the improvement in the basic account funding position, which are discussed in the report.

The College Pension Board of Trustees
395 Waterfront Crescent
Victoria, BC V8T 5K7

I. Scope of the Valuation

In accordance with Section 12 the Joint Trust Agreement (the "JTA")¹ and on the instructions of the College Pension Board of Trustees (the "Board of Trustees"), we completed an actuarial valuation of the Basic Account and the Inflation Adjustment Account of the College Pension Plan (the "Plan") as at August 31, 2015 and are pleased to submit this report thereon. The primary purpose of this valuation is to determine the financial position of the Basic Account as at August 31, 2015 and to report on the adequacy of the member and employer contribution rates.

Two primary valuations were carried out:

- **A Funding Valuation** - to determine the financial position of the Basic Account as at August 31, 2015 and to report on the adequacy of the member and employer contribution rates. The Funding Valuation focuses only on the Basic Account and does not examine the Inflation Adjustment Account ("IAA") and its ability to meet future indexing requirements. Furthermore, it ignores the limits on benefits imposed by the *Income Tax Act* ("ITA") on registered pension plans - such excess benefits are paid on a current cash basis through the Supplemental Benefits Account, which is maintained at a zero balance; and
- **A Sustainable Indexing Valuation** - to determine the rate of indexing that can be sustained in the long term, based on the financial position of the Basic Account and the Inflation Adjustment Account, and the overall level of contributions to the plan.

In addition to the above, we have performed supplementary funding valuations as follows:

- For basic and indexed benefits, on the presumption that indexed benefits are to be fully funded, in advance, as for basic benefits; and
- Limiting benefits to those permitted under the *ITA*; this is done both for basic benefits only, and for basic plus indexed benefits.

¹ The JTA was signed on April 4, 2011 and became effective on June 22, 2012. It incorporates the joint trust arrangements previously covered in Schedule A of the *Public Sector Pension Plans Act*.

The intended users of this report are The Board of Trustees, the Financial Institutions Commission of British Columbia ("FICOM") and Canada Revenue Agency ("CRA"). This report is not intended or necessarily suitable for other purposes than those listed above.

II. Changes in Plan

The last valuation of the Plan, prepared as at August 31, 2012 and included in our report dated May 21, 2013, determined the financial position of the Plan as amended to August 2012. Since then, a number of changes have been made to the Plan. The major changes affecting the Plan's financing include:

- Effective September 1, 2013, member contribution rates to the Basic Account were increased to 8.22% of salary up to the Yearly Maximum Pensionable Earnings ("YMPE") and 8.97% of salary above the YMPE.
- Effective September 1, 2013, employer contribution rates to the Basic Account were increased to 8.32% of salary up to the YMPE and 9.07% of salary above the YMPE.
- Effective September 30, 2015, the plan rules were amended to ensure compliance with the enactment of the new PBSA and Regulation.
- Effective January 1, 2016, the plan rules were amended to implement plan design changes as follows:
 - the pension accrual rate on earnings below the YMPE was increased from 1.7% to 2% for pensionable service accrued after December 31, 2015;
 - to remove the integration of member and employer contribution rates with the YMPE as follows:
 - member contribution rates to the Basic Account were updated to a single rate of 8.39% of salary for earnings below and above the YMPE ; and
 - employer contribution rates to the Basic Account were updated to a single rate of 8.49% of salary for earnings below and above the YMPE;
 - member and employer contribution rates to the Inflation Adjustment Account were increased from 1.38% to 1.47% of salary;
 - the early retirement reduction rate for service accrued after December 31, 2015 was amended to 3% per year below age 65 for all members, except for members who have reached age 55 and have at least 35 years of contributory service who continue to be entitled to an unreduced retirement benefit.
- Effective April 1, 2016, member and employer contribution rates to the Inflation Adjustment Account were increased to 1.57% of salary each.

There were no other benefit changes that had a material financial impact on the Plan.

The changes, and the main provisions of the Plan, are described in Appendix A.

III. Actuarial Methods and Assumptions

1. Financing Method and Adequacy of Contribution Rates

(a) Funding Criteria

In any pension system, the rates of member and employer contribution should be such that:

- the present value of all future contributions at those rates
- **equals** the present value of all future benefits
- **minus** the funds on hand.

There are numerous financing methods that will satisfy this equation. At one end is the pay-as-you-go or current disbursement method; under this method, contributions are limited to those necessary to finance current benefit disbursements, so that no assets are accumulated. At the other end is the achievement of full funding within a reasonable period; this results in the accumulation of substantial assets.

The general criteria we use in establishing the appropriate level of contributions to the College Pension Plan include the following:

- (i) **Benefit security** - the probability of fulfilling the present benefit promises provided in the Plan depends on a mixture of political, economic and financial factors; but, whatever the probability, obviously benefit security would be enhanced with a larger accumulation of assets.
- (ii) **Stability of contributions** - the financing system should result in contribution rates that are relatively stable over an extended period of time.
- (iii) **Allocation of costs** - as far as is practicable, pension costs should be allocated to the generation that incurs them; there is no assurance that future generations will assume the burdens transferred to them by prior generations.

The Board has adopted a formal funding policy (most recently revised in March 2016) in which it identified benefit security as its primary funding objective and contribution stability as an important secondary objective. We have taken this into account in carrying out this valuation.

(b) Indexing Treatment

The current financing provisions are described in Appendix A. Member and employer contributions are at rates set out in the Plan rules. A larger part of these contributions is allocated to the Basic Account, and a smaller portion to the IAA. The future indexing of pensions is based on funds available in the IAA, which derives its funds primarily from these allocated contributions, from excess investment earnings on pensioner reserves in the Basic Account, and from investment earnings within the IAA itself.

In a sense, the IAA operates akin to a defined contribution or money-purchase account in that the value of indexing benefits is limited to the assets in the IAA. Future cost-of-living adjustments are not guaranteed, but are granted at the discretion of the Board, subject to the availability of funds in the IAA. Where there are sufficient monies in the IAA, full CPI indexing is provided; alternatively, if the monies in the IAA cannot support full CPI indexing, then the amount of indexing is limited to the monies available. In either case, the mechanics are such that the capitalized value of the indexing granted is transferred from the IAA to Basic each time indexing is granted. Thus, the system will limit indexing, if necessary, so that the granting of any increases for indexing should not create (or increase) an unfunded liability, or reduce an actuarial surplus. Accordingly, we did not consider any future indexing in determining the financial status of the Basic Account.

However, we also show supplementary results on the assumption that the assets of, and future contributions to, the Basic Account and the IAA are combined, with benefits to be fully indexed and funded in advance, as for basic benefits.

(c) Basic Account Valuation - Current Financing

We determined the financial status of the Plan for the Basic Account only (i.e. ignoring any indexing granted after August 31, 2015). The methods used are described in Appendix B.

(d) Funding Requirements

The approach taken in this valuation (set out in the following sections) has taken into account the requirements of the Board's funding policy, as well as the requirements of the Joint Trust Agreement.

(e) Normal Cost and Amortization of Surplus or Unfunded Liability

An entry-age funding approach is used. As a first step, contributions are calculated as the level, long-term rate of pay required to finance the benefits of new entrants to the Plan over their working lifetimes, so that their projected benefits are fully secured by equivalent assets by the time they retire (the "normal cost rate" or the "entry-age rate"). Thus, to the extent actuarial assumptions are realized, the addition of new entrants to the Plan should generate neither unfunded liabilities nor surpluses.

Next, the funded position of the plan at the valuation date is considered. The liability takes into account benefits earned to the valuation date as well as benefits expected to be earned for future service by existing members. Asset values are taken at smoothed market values for existing assets, plus projected future contributions in respect of the existing members at the entry-age normal rates. The resulting net financial position may be either an actuarial surplus or an unfunded actuarial liability.

This surplus, or unfunded liability, is amortized over a specified period as outlined in the funding policy, e.g., 25 or 15 years (In the case of a surplus, only the surplus in excess of 5% of the net liability is amortized).

Minimum contributions, expressed as a percentage of payrolls, revert to the normal cost rate after the unfunded liability or surplus has been amortized.

(f) PBSA Requirements

The Pension Benefits Standards Act ("PBSA") imposes certain minimum funding requirements on pension plans registered in British Columbia. These include the determination of a plan's financial position on a solvency basis as well as the more usual going-concern basis, the amortization of unfunded actuarial liabilities over a maximum of 15 years, and special rules regarding the treatment of surplus. While the College Pension Plan is one of a number of British Columbia public sector plans that are exempt from these provisions, the current joint trusteeship arrangement requires that the Plan's financing comply with the PBSA requirements for a going-concern valuation. This report therefore complies with the going-concern valuation requirements of the PBSA. As the valuation date is prior to the September 30, 2015 effective date of the new PBSA, strictly speaking this valuation is carried out under the prior PBSA. From a practical perspective, the required minimum contribution rates are the same under both acts.

(g) Test Contribution Adequacy

Under the *PBSA* going-concern requirements, the employers and the members must contribute the full normal actuarial cost (e.g. the "entry-age rate" described in (e) above). In addition, unfunded liabilities must be amortized over not more than 15 years from when they are established. For this purpose the unfunded liability that needs to be amortized from the valuation date is the unfunded liability described above, reduced by the present value of any previously established amortization amounts.

Surpluses may be applied to reduce the contribution requirements from the previously set level. The rate may only be reduced below the normal actuarial cost after a surplus margin of 5% of liabilities has been set aside, with the remaining surplus to be amortized over not less than 5 years. The Board sets out its policy with regard to amortization of surplus in its funding policy.

The Board's funding policy reflects these constraints and, accordingly, we have calculated theoretical contribution requirements as follows:

- Calculate the "normal cost rate" (i.e. the "entry-age rate") and the resulting surplus (or unfunded liability) using this rate;
- If there is an unfunded liability after allowing for the value of any previously established amortization amounts, amortize it over 15 years from the current valuation date.
- If there has been a gain since the last valuation, i.e. the currently scheduled amortization rates applied for the balance of the previously established amortization periods are more than sufficient to amortize the previously identified unfunded liabilities; apply the gain to amortize or reduce the previously identified unfunded liabilities, starting with the oldest established. This results in a

reduction in the required amortization rates, with the revised rates in effect for the previously established periods

- If there is a surplus after removing all previously established amortization requirements, allocate up to 5% of the net liability (the “PBSA minimum surplus”) as a rate stabilization reserve. Then calculate the contribution rate arising after amortizing any surplus in excess of the PBSA minimum surplus over a 15-year period and over a 25-year period. The contribution rate with a 15-year amortization of any surplus will be lower than the rate with a 25-year amortization of the same surplus.
- If the current contribution is between the 15 and 25-year rates, then the rate should remain unchanged. Effectively, the surplus in excess of the PBSA minimum surplus is applied as an additional rate stabilization reserve.
- If the current contribution rate is greater than the 25-year contribution rate, then there is “excess surplus”. The first priority for this excess surplus will be to support indexing at the current maximum sustainable level by transferring assets to the IAA. The Board may then decide how to apply any remaining excess surplus. Alternatives, as set out in the JTA include:
 - reducing the contribution rate;
 - improving benefits;
 - making a transfer to the Inflation Adjustment Account;
 - setting aside a rate stabilization reserve.
- If the current contribution rate is lower than the 15-year contribution rate, then the rate should be increased to be equal to the 15-year contribution rate.
- The resulting contribution rate will comply with the PBSA minimum requirement.

The JTA requires any contribution rate changes, up or down, to be shared equally by the members and the employers. Thus, we express the future cost requirements as a combined member-plus-employer amount.

2. Sustainable Indexing Valuation

The Sustainable Indexing Valuation is carried out to establish the maximum level of indexing that can be provided over the period until the next valuation in a manner that allows indexing to be sustained in the long term and is fair from the perspective of intergenerational equity.

As for the Funding Valuation, we have used an entry age approach. We start by calculating the long term contribution rate that is required to fund the benefits (including indexing at the target rate) over the life time of a typical new entrant, assuming the Plan has neither a surplus nor an unfunded liability.

Next, we need to calculate how this long term contribution rate should be adjusted to reflect the funded position of the Plan. The assets, consisting of the current funds plus the value of future contributions at this entry age rate, are compared to the liabilities (including the provision for indexing at the target rate). Subtracting the liabilities from the assets gives rise to a surplus or unfunded liability. We amortize this surplus or unfunded liability (in certain cases, adjusted as described below) over an infinite period to obtain the level long-term contribution that is required to support indexing at the target level.

For the target level of indexing to be sustainable, this long term contribution requirement must not exceed the long term contributions that are committed to be paid into the plan, while from an intergenerational equity perspective, we require the long term commitment and long term requirement to be equal.

The calculation of the long term contribution commitment can be complicated when the members and employers are paying amortization amounts into the plan for a temporary period. We therefore defined the long term contribution commitment as the normal cost of the current Basic benefits, plus the fixed IAA contributions. Effectively, these are the amounts that the members and employers can expect to pay in the absence of any unfunded liabilities or surplus.

Any Funding Valuation amortization requirements are excluded from the long term contribution commitment, as these amounts are only payable for a limited period of time. Instead, the effect of these amortization amounts, if any, is allowed for by including their present value as an adjustment to the unfunded liability; the unfunded liability calculated in the Sustainable Indexing Valuation is thus reduced by the present value of any Funding Valuation required amortization amounts.

3. Actuarial Assumptions

The rates of investment return, salary increase, indexing, mortality, withdrawal, disability and retirement experienced by members of the fund were examined for the three year period ending on the valuation date, together with corresponding experience for earlier periods and with other assumptions affecting the valuation results. We discussed the implications of the assumptions, and changes to them, with the Board.

The assumptions and the approach to setting them are described in Appendix B. In summary, the Funding Valuation, used to set the Basic contribution rate, requires margins for adverse deviations, while it is appropriate to use best estimate assumptions when carrying out the Sustainable Indexing Valuation. As a result, certain key assumptions differ between the two valuations and two sets of assumptions are required. For ease of reference we refer to these as the Funding Valuation assumptions and the Sustainable Indexing Valuation assumptions.

Following discussions with the Board, we made adjustments to some of the economic, demographic and other assumptions. The assumptions are discussed in detail in Appendix B; the key economic assumptions are summarized below (assumptions for the previous valuation are in brackets).

	Funding Valuation	Sustainable Indexing Valuation
Annual Investment Return	6.25% (6.50%)	6.50% (6.75)
Annual Salary Increase	3.50% (3.75%) plus seniority	3.25% (3.50%) plus seniority
Annual Indexing	0% for basic costs 2.75% (3.0%) for indexed costs	2.50% (2.75%) for fully indexed costs Sustainable level of indexing calculated as valuation output

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

4. Membership Data

Data as of August 31, 2015 were prepared by the Pension Corporation. The data are described in detail in Appendix B and numerically summarized in Appendices C, D and E.

5. Benefits Excluded

No benefits have been excluded from the valuation.

IV. Results of the Funding Valuation

1. Basic Account - Actuarial Position

Schedule 1 shows a statement of the actuarial position of the funding valuation of the Plan as at August 31, 2015. This statement ignores liabilities for future indexing granted after the valuation date and assumes that member and employer contribution rates for basic pensions will be made at the entry-age normal cost rate i.e. 16.63% of payroll, plus the previously established amortization amounts totaling 0.06% of payroll currently scheduled to expire in 2021 and 1.04% of payroll scheduled to expire in 2027.

Schedule 1 - Statement of Actuarial Position as at August 31, 2015
Basic Account - Non-Indexed Benefits – Entry-age Normal Cost

Valuation Year	(\$000's)		
	2015	2012	2012
Benefits	allowing for 2016 benefit changes	allowing for 2016 benefit changes	prior to 2016 benefit changes
Contribution Rate	Level	Level	Integrated
Assets			
Market Value of Basic Account	3,639,305	2,598,671	2,598,671
Asset Smoothing Adjustment	(291,145)	(49,281)	(49,281)
Smoothed Value of Basic Account	3,348,160	2,549,390	2,549,390
Actuarial present values of future contributions at entry-age rates	1,013,178	955,855	960,562
Total Assets – without previously scheduled amortization	4,361,338	3,505,245	3,509,952
Liabilities			
Actuarial present values for			
- pensions being paid	1,618,167	1,179,613	1,179,613
- inactive members	200,574	173,160	172,621
- active members	2,438,950	2,215,940	2,230,438
- future expenses	36,555	36,252	36,252
Total Liabilities	4,294,246	3,604,965	3,618,924
Surplus (Unfunded Liability) – without previously scheduled amortization	67,092	(99,720)	(108,972)
Funded Ratio excluding amortization: Total Assets ÷ Total Liabilities	101.6%	97.2%	97.0%
Surplus (Unfunded Liability) – without previously scheduled amortization	67,092	(99,720)	(108,972)
- Present value of existing amortization (0.06% to 2021)	2,632	3,576	3,576
- Present value of existing amortization (1.04% to 2027) ¹	84,594	96,144	n/a
- Present value of existing amortization (1.14% to 2027)	n/a	n/a	105,396
Surplus (Unfunded Liability) – with previously scheduled amortization	154,318	0	0
Funded Ratio including amortization: Total Assets (with amortization) ÷ Total Liabilities	103.6%	100.0%	100.0%

¹ The amortization requirement of 1.14% of payroll to 2027 was calculated in the 2012 valuation based on the benefits then in force. When the benefits were amended, effective January 1, 2016, this amortization amount was revised to 1.04% of payroll.

2. Change in Actuarial Position

The statement of actuarial position included in Schedule 1 indicates that, relative to the restated 2012 valuation result after taking into account the 2016 benefit changes and associated entry-age normal cost and amortization requirements, a surplus of \$154 million has emerged since August 31, 2012. The \$154 million surplus is the net result of a number of items, the most significant items being higher than assumed investment returns and lower than assumed salary increases, offset by changes in the economic and demographic valuation assumptions.

Schedule 2 - Change in Actuarial Position

	Approximate effect (\$ millions)
1. Surplus at August 31, 2012 ¹	0
2. Actual income from investments higher than 6.5% assumed rate (on smoothed values)	254
3. Actual contributions lower than previously assumed ²	(16)
4. Actuarial salary increases to August 31, 2015 lower than previously assumed	61
5. Changes in valuation demographic assumptions	(74)
6. Changes in valuation economic assumptions	(83)
7. Other factors (a net gain) including changes in plan membership and other differences between actuarial assumptions and actual experience during the intervaluation period	12
8. Surplus at August 31, 2015	154

The \$74 million loss due to changes in demographic assumptions (shown in item (5)) is the net result of the following (the assumption changes are described in Appendix B):

Change in Actuarial Position Arising from Change in Actuarial Assumptions

Assumption change	Approximate effect (\$ millions)
Pre-retirement mortality	0
Disability incidence rate	0
Withdrawal rates	3
Retirement rates	5
Post-retirement mortality	(77)
Post-retirement mortality for disabled pensioners	(5)
Total	(74)

¹ After allowing for amortization of 0.06% of pay for 9 years and 1.04% of pay for 15 years from 2012, which resulted following allowance for the 2016 benefit changes.

² This arises for two reasons. Firstly, the contribution rate increase calculated in the 2012 valuation is assumed to occur at the valuation date, while in fact it occurred 12 months after the valuation. Secondly, the amortization payments received since the last valuation are lower than expected due to the payroll increases being lower than assumed.

3. Adequacy of Contribution Rates

As discussed previously in Section III, the required contribution rate consists of the normal cost plus an adjustment to amortize any surplus or unfunded liability. These components of the required contributions are discussed in more detail below.

(a) Normal Cost Rate

The current service contribution, inclusive of contributions by members, required to finance the basic pensions of new entrants (i.e. the normal actuarial cost) was 16.84% of salaries (integrated) as of the August 31, 2012 valuation. After allowing for the benefit changes effective January 1, 2016, this changed slightly to 16.85% of salaries (integrated). Converting this integrated rate to an equivalent level (i.e. non-integrated) rate results in a normal cost of 15.82% of salaries as at August 31, 2012. The normal cost as of the August 31, 2015 valuation has increased by 0.81% of salaries from 15.82% of salaries to 16.63% of salaries (level).

This 0.81% increase in normal cost rate is developed in Appendix F and is the net result of a number of items, the most significant being:

- The change in the mortality assumption (cost increase of 0.66%); and
- The change in the economic assumption (cost increase of 0.50%); offset by
- The change in the new entrant demographic profiles (cost decrease of 0.30%); and
- The change in the termination assumption (cost decrease of 0.10%).

(b) PBSA Required Rate – Minimum Permissible Rate

The valuation shows a surplus of \$154,318,000 when including the present value of the existing amortization requirements established at the 2012 valuation (as amended to allow for the 2016 benefit changes) of \$87,226,000. As there is a surplus of \$67,092,000 excluding the existing amortization requirements, the PBSA allows these amortization requirements to be eliminated entirely.

The minimum PBSA required contribution rate is then equal to the normal cost less the 5 year amortization of any surplus in excess of 5% of the net liabilities. Five percent of the net liabilities is \$164,053,000¹, which exceeds the 2015 surplus of \$67,092,000. Thus the surplus may not be amortized under the PBSA requirements. The PBSA minimum required contribution rate is therefore the entry age normal cost rate of 16.63% of salaries (level).

The current contribution rates, the contribution rates for current service (on an entry-age basis, i.e. the normal actuarial cost) and the minimum permissible (PBSA required) contribution rates are summarized in

¹ Any surplus less than this can be considered to be a compulsory rate stabilization reserve.

Schedule 3. It is not necessary for the current contribution to be reduced to the minimum permissible contribution rate, but any decrease in contribution rates must be shared equally between members and employers.

Schedule 3 - Current and Required Basic Contribution Rates

	Based on valuation results as at August 31		
	2015 (%)	2012 (%)	2012 (%)
Current contribution rates			
Member	8.39	8.31 ¹	8.31 ¹
Employer	8.49	8.41 ¹	8.41 ¹
Combined member/employer	16.88	16.72¹	16.72¹
Required contribution rates	Allowing for 2016 benefit changes (level)	Allowing for 2016 benefit changes (level)	Prior to 2016 benefit changes (integrated)
Entry-age normal cost rate	16.63	15.82	16.84 ¹
Amortization of unfunded actuarial liability (surplus ²)			
▪ 25 year amortization	-	0.73	0.80
▪ 15 year amortization	-	1.08	1.18
▪ <i>PBSA</i> amortization			
to 2021	-	0.06	0.06
to 2027	-	1.04	1.14
Total <i>PBSA</i> amortization	-	1.10	1.20
Total contribution rate			
▪ 25 year amortization	16.63	16.55	17.64 ¹
▪ 15 year amortization	16.63	16.90	18.02 ¹
▪ <i>PBSA</i> rate	16.63	16.92	18.04 ¹
Total required contribution rate	16.63	16.92	18.04¹

The above results indicate a *PBSA* minimum rate of 16.63% of salaries compared to the current rate of 16.88%, i.e. the current rate is 0.25% higher than the minimum required.

4. Revised Contribution Rates

The JTA requires any contribution rate changes, up or down, to be shared equally by the members and the employers.

¹ Less 0.75% of salary up to the YMPE (for each of the members and the employers).

² The 25 year, 15 year and *PBSA* amortization requirements are applied to the surplus in excess of 5% of the net liability.

As a result, current rates may be decreased by a maximum of 0.24% of salaries (after rounding). Sharing this equally would result in a maximum decrease of 0.12% of salaries each for the members and the employers.

When this is combined with the current IAA contribution rates, the revised minimum permissible rates become:

Schedule 4 - Current and Required Total Contribution Rates

	Member	Employer	Total
Current Basic Account	8.39%	8.49%	16.88%
Minus maximum permissible Basic Account reduction	0.12%	0.12%	0.24%
Total Minimum Permissible Basic Rate	8.27%	8.37%	16.64%
Current IAA ¹	1.57%	1.57%	3.14%
Total Minimum Permissible Rate	9.84%	9.94%	19.78%

Under the *ITA*, there is a requirement that individual member contributions may not exceed the lesser of:

- (a) 9% of salary, or
- (b) \$1,000 plus 70% of the member's pension credit

although these conditions may be waived by the Minister of Finance provided that the contributions are "determined in a manner acceptable to the Minister and it is reasonable to expect that, on a long-term basis, the aggregate of the regular current service contributions made under the provision by all members will not exceed 1/2 of the amount that is required to fund the aggregate benefits in respect of which those contributions are made."

Both the current member contributions and the minimum permissible member contributions will exceed this limit, so regardless of the decision by the Board with respect to contribution rates, it will be necessary to apply to the Minister for a waiver. The employer contributions currently exceed the member contributions by 0.1% of salaries. As IAA contribution rates are fixed and any future Basic contribution rate changes must be shared equally in terms of the JTA, the requirement that the member contributions will not exceed half of the amount required to fund the aggregate benefits is met. A similar exemption was required, and obtained, following the 2012 valuation.

5. Other Plan Changes

As the valuation shows a surplus, in addition to reducing the Basic contribution rate to the minimum permissible rate previously discussed, the Board can, subject to the funding policy, also consider:

¹ Effective April 1, 2016.

- Improving benefits;
- Making a transfer to the Inflation Adjustment Account;
- Setting aside a rate stabilization reserve;
- Or any combination of these four alternatives.

The Basic contribution rate after implementing any decisions may not exceed the current contribution rate of 16.88% and the cost of any benefit improvements have to be funded over no less than 25 years.

The funding policy requires that when there is a surplus, first establish a rate stabilisation reserve of up to 5% of the net liability. This has been done in the calculations shown above. Next it is necessary to ensure that the sustainable indexing maximum does not decline from its current level before taking any other action. If necessary, a transfer from the Basic account to the IAA will be made sufficient to ensure this outcome. At this valuation such a transfer is not required. We are happy to discuss alternatives with the Board at its convenience.

6. Accrued Benefits - Funded Ratio

Another index of funding some readers of the report may want to examine is the accrued benefits funded ratio. The accrued benefits funded ratio is calculated by dividing the Basic Account assets by the total liability for benefits accrued in respect of service to the valuation date. The asset/liability comparison is analogous to that in Schedule 1, except that contributions and benefits in respect of future service to be worked by existing members are excluded from the comparison. The results are shown below.

Schedule 5 - Accrued Benefits – Funded Ratio at August 31, 2015

Basic Account – Non-Indexed Benefits

	(\$000's)	
	2015	2012
Fund (Basic Account):		
Smoothed value of assets	3,348,160	2,549,390
Accrued Liabilities		
▪ for pensions being paid	1,618,167	1,179,613
▪ for inactive members	200,574	172,621
▪ for active members	1,367,390	1,218,996
Total Accrued Liabilities	3,186,131	2,571,230
Surplus (Unfunded Actuarial Liability): for accrued service only	162,029	(21,804)
Funded Ratio: Fund ÷ Total accrued liabilities	105%	99%

The above schedule indicates that the funded ratio for accrued benefits has improved from about 99% to 105%. This is largely for reasons similar to the items in the analysis in Schedule 2, but excluding those items related to future contribution rates.

7. Sensitivity Analysis

Sensitivity Analysis under Standards of Practice

The Canadian Institute of Actuaries Practice-Specific Standards for Pension Plans require disclosure of the effect of using a discount rate (investment return) 1.0% lower than that used for the valuation on:

- (a) The actuarial present value, at the calculation date, of projected benefits allocated to periods up to the calculation date, and
- (b) The service cost or the rule for calculating the service cost between the calculation date and the next calculation date.

The table below shows the impact on the accrued liability as required by (a) and the entry-age normal cost as required by (b) as at August 31, 2015 of a one percentage point drop in the discount rate assumption. All other assumptions were kept unchanged.

Sensitivity – Impact of 1% drop in investment return on Accrued Benefits and Normal Cost

Impact on liabilities of 1% drop in discount rates	Going Concern 6.25% (\$,000's)	Going Concern 5.25% (\$,000's)	Increase (\$,000's)
Active members	1,367,390	1,599,904	232,514
Disabled members	68,519	78,658	10,139
Terminated members	132,055	153,708	21,653
Pensioners and beneficiaries	1,618,167	1,769,165	150,998
Total increase in liabilities			415,304

Impact on normal cost rate of 1% drop in discount rates	Going Concern 6.25%	Going Concern 5.25%	Increase
Current service cost rate	16.63%	20.34%	3.71%

Sensitivity Analysis for Plan Funding

Given that the plan is funded on the entry-age basis, we have also considered the impact of a one percentage point drop in the investment return assumption on the Basic Account non-indexed benefits consistent with Schedule 1. These figures are summarized in the table below:

Sensitivity – Impact of 1% drop in investment return on Plan Funding

	(\$000's)		
	6.25%	5.25%	Increase
Smoothed Value of Fund	3,348,160	3,348,160	0
Actuarial present values of:			
▪ Future contributions at entry-age rates	1,013,178	1,313,422	300,244
▪ Present value of existing amortization	87,226	92,021	4,795
Total Assets	4,448,564	4,753,603	305,039
Total Liabilities	4,294,246	4,999,912	705,666
Surplus/(Unfunded liability) on entry-age basis	154,318	(246,309)	(400,627)
Entry Age Normal Cost	16.63%	20.34%	3.71%
PBSA Amortization	0.00%	3.45%	3.45%
PBSA Minimum rate – Schedule 3	16.63%	23.79%	7.16%

8. Supplementary Funding Valuations

Results analogous to those in Schedules 1, 3 and 5 are shown in Appendix G, on the following bases:

- For basic and indexed benefits combined, on the assumption that indexed benefits are to be fully funded, in advance, as for basic benefits;
- For basic only, and basic plus indexed benefits, including only benefits accrued to the valuation date; and
- Limiting benefits to those permitted under the *Income Tax Act*; this is done both for:
 - basic benefits only; and for
 - basic plus indexed benefits.

The adjustments to the assumptions are discussed in Appendix B. The fully indexed funding valuation result takes into account IAA contributions of 1.57% from each of members and employers. The key results are summarized below:

Schedule 6 - Indexed Benefits (no tax limits)

Funded position	Basic Only	Basic + Indexed
	(\$000's)	(\$000's)
Smoothed Value of Fund	3,348,160	3,745,950
Actuarial present values of:		
▪ Future contributions at entry-age rates	1,013,178	1,396,394
▪ Present value of existing amortization requirements		
(i) 0.06% to 2021	2,632	2,632
(ii) 1.04% to 2027	84,594	84,594
Total Assets	4,448,564	5,229,570
Total Liabilities	4,294,246	5,744,979
Surplus (Unfunded Liability) including existing amortization	154,318	(515,409)
Present value of existing amortization	(87,226)	(87,226)
Surplus (Unfunded Liability) to be amortized over 15 years	67,092	(602,635)
Contribution Rates (Level)		
Member – revised, as shown in Schedule 4	8.39%	9.96%
Employer – revised, as shown in Schedule 4	8.49%	10.06%
Total – revised, as shown in Schedule 4	16.88%	20.02%
Entry-age normal cost	16.63%	22.92%
Amortization ¹	0.00%	6.15%
Total – entry-age	16.33%	29.07%

If assets and liabilities are restricted to accrued service only, i.e. analogous to Schedule 5 earlier, the 2015 surplus (unfunded liability) figures change as follows:

Schedule 7 – Indexed Accrued Benefits (no tax limits) – Funded Ratio at August 31, 2015

	(\$000's)	
	Basic Only	Basic + Indexed
Assets	3,348,160	3,745,950
Liabilities	3,186,131	4,247,286
Surplus (Unfunded Liability)	162,029	(501,336)
Funded Ratio	105%	88%

¹ Basic amortization is as required by the *PBSA*; Basic + Indexed amortization is over 15 years.

Benefits Limited to ITA Maximums

When the income tax limits on benefits are recognized, the above unfunded liabilities and normal cost rates change marginally. The key results are summarized below.

Schedule 8 – Benefits Limited to ITA Maximums – Basic Only

Basic Only	Without Tax Limit	With Tax Limit
Surplus (Unfunded Liability)	\$000's	\$000's
Entry Age Basis (including scheduled amortization)	154,318	163,092
Accrued Service Only (no scheduled amortization)	162,029	172,586
Contribution Rate	%	%
Entry-age normal cost	16.63	16.49
PBSA Amortization	0.00	0.00
Total	16.63	16.49

Schedule 9 – Benefits Limited to ITA Maximums – Indexed Benefits

Basic and Indexed	Without Tax Limit	With Tax Limit
Surplus (Unfunded Liability)	(\$000's)	(\$000's)
Entry Age Basis (including scheduled amortization)	(515,409)	(504,076)
Entry Age Basis (excluding scheduled amortization)	(602,635)	(591,302)
Accrued Service Only (no scheduled amortization)	(501,336)	(487,636)
Contribution Rate	%	%
Entry Age Normal Cost	22.92	22.74
15 year Amortization	6.15	6.03
Total	29.07	28.77

9. Test Maximum Surplus and Contributions for Tax Purposes

Section 147.2(2) of the *Income Tax Act* limits employer contributions that may be made to a plan if there is a surplus and it exceeds a certain amount - the plan becomes revocable if contributions are made when such surplus exists. The tax rules also require that employer contributions not exceed the normal cost rate plus amounts necessary to amortize an unfunded liability.

Since the Plan has a surplus in the Basic Account it may appear as if this restriction might apply. However, subsection (c) of Section 147.2(2) of the *Income Tax Act* also provides that the benefits taken into account for the purposes of a contribution recommendation "may include anticipated cost-of-living and similar adjustments where the terms of a pension plan do not require that those adjustments be made but it is reasonable to expect that they will be made."

Indexing at full CPI was provided from January 1, 1982 to January 2011 under the present Plan terms, and for many years before that under earlier Plan provisions. As discussed earlier, the plan has moved to a sustainable indexing basis effective January 2011, whereby indexing is limited based on the financial position of the plan at the most recent valuation. Under this approach, if the contribution levels supported it, full indexing in line with increases in the cost of living would be provided. Thus, it is appropriate for purposes of testing the *ITA* 147.2(2) limits to recognize, in advance, the future indexing of pensions for the present Plan membership. On this basis, the valuation results on the fully indexed basis, recognizing the income tax limits on benefits, apply.

Thus, on the premise that it is appropriate for the Plan to recognize future indexing for the purposes of testing the *ITA* contribution limits, there is an unfunded liability, and furthermore, the required contribution rates are lower than the fully indexed normal cost rate. In other words, without even considering any amortization of the unfunded liability, the required rates are acceptable under the *ITA* and contributions may remain at the current level of 20.02%

We have commented previously (under section 4) on the 9% limit that applies to individual member contributions.

V. Sustainable Indexing Valuation

The Sustainable Indexing Valuation establishes the level of indexing that can be sustained in the long term taking into account the assets of the plan and the long term funding commitment to the Plan. The valuation basis is different from the Funding Valuation basis as discussed in Section III and Appendix B.

1. Long Term Funding Commitment and Amortization Requirements

Based on the results discussed in Section IV, the contribution requirements of the plan can be summarised as:

Long Term Funding Commitment	2015
Normal (entry-age) actuarial cost	16.63%
IAA contributions	3.14%
Long term funding commitment - excluding current amortization schedule	19.77%

2. Results

We have calculated that the 2015 sustainable indexing level to be 2.07% per year. This result is an increase from the equivalently calculated 2012 sustainable indexing level of 1.83%.

Allowing for indexing of 2.07% per year, and using the sustainable indexing assumptions discussed earlier, we obtain the following balance sheet and contribution requirements:

	2015
	(\$000's)
Sustainable Indexing Target	2.07%
Assets	
Market Value of Fund	4,071,685
Asset Smoothing Adjustment	(203,584)
Smoothed Value of Fund	3,868,101
Actuarial present values of contributions at Entry Age Normal Cost ¹	1,161,423
Total Assets	5,029,524
Total Liabilities	5,071,480
Surplus (Unfunded Actuarial Liability)	(41,956)
Contribution Requirements	
Entry Age Normal Cost - based on sustainable indexing target	19.61%
Amortization of (surplus)/unfunded liability over infinite period	0.16%
Required contribution	19.77%
Long term contribution commitment	19.77%

The above results show that, at an indexing rate of 2.07% per year, the required contribution rate is 19.77% of pay, which is equal to the long term contribution commitment. It is thus reasonable to conclude that indexing of 2.07% per year can be sustained in the long term. We recommend that the maximum indexing amount referred to in Section 73 of the plan rules be set at not more than 2.07% per year. This is an increase from the level of 1.83% per year set following the 2012 valuation.

As there is an increase in the maximum sustainable indexing level since the 2012 valuation, there is no requirement for the Board to transfer any of the Basic Account excess surplus to the IAA. The options open to the Board with regards to the excess surplus are outlined in Section III 1(g).

The main reasons for the improvement in the sustainable indexing level are similar to the improvement in the basic account funding position, which are discussed in the analysis in Schedule 2.

The sustainable level of indexing will be re-evaluated at the next valuation and is likely to differ from the current level as a result of ongoing experience gains or losses and any changes to the valuation assumptions at that time.

¹ This allows for indexing at 2.07% and reflects a 6.5% discount rate.

VI. Subsequent Events

To the best of our knowledge, there are no material subsequent events that would affect the results and recommendations of this valuation. Any investment experience occurring between the valuation date and the report date, which differs from the assumption made, is not reported on in this valuation report and will be reported on in future valuations.

VII. Actuarial Opinion

In our opinion,

- (a) the membership data on which the valuation is based are sufficient and reliable for the purposes of the valuation,
- (b) the assumptions are appropriate for the purposes of the valuation, and
- (c) 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. Pursuant to the JTA and regulatory requirements, the next valuation should be completed no later than as of August 31, 2018.

VIII. Acknowledgement

We gratefully acknowledge the generous assistance of the staff of the Pension Corporation in the preparation of the data and other items required for this report.

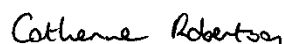
Respectfully submitted,



Richard A. Border
Fellow of the Canadian Institute of Actuaries¹
Fellow of the Institute and Faculty of Actuaries



Wendy F. Harrison
Fellow of the Canadian Institute of Actuaries
Fellow of the Society of Actuaries



Catherine Robertson
Fellow of the Canadian Institute of Actuaries¹
Fellow of the Institute and Faculty of Actuaries

May 12, 2016

¹ Canadian Institute of Actuaries is the Primary regulator.

Appendix A: Summary of Plan and Amendments as at August 31, 2015

Changes to the Plan

The previous valuation was based on the provisions of the Plan as at August 31, 2012. Since then, the Plan has been amended a number of times. The main changes to January 1, 2016¹ are summarized below.

- Effective June 7, 2013, a new part was added to the plan rules to clarify the terms and conditions for an employer to withdraw from the Plan.
- Effective September 1, 2013, member and employer contribution rates were amended as follows:
 - member contribution rates increased from 7.56 per cent to 8.22 per cent of salary for earnings up to the year's maximum pensionable earnings (YMPE) and from 8.31 per cent to 8.97 per cent of salary for earnings above the YMPE for contributions to the Basic Account; and
 - employer contribution rates increased from 7.66 per cent to 8.32 per cent of salary for earnings up to the YMPE and from 8.41 per cent to 9.07 per cent of salary for earnings above the YMPE for contributions to the Basic Account.
- Effective March 31, 2014, the plan rules were amended to ensure compliance with the enactment of the *Wills, Estate and Succession Act* (WESA) by implementing all nomination of beneficiary changes required under WESA. The amendment also specifies post-retirement beneficiaries of single life guaranteed pensions have the option of receiving their benefit as either a lump-sum payment or a stream of pension payments, with the exception of non-person beneficiaries whose only option is to receive a lump sum payment.
- Effective December 3, 2014, the plan rules were amended to ensure compliance with the Income Tax Regulations (ITR) and the *Pension Benefits Standards Act* (PBSA) by removing a provision providing the plan administrative agent may, with the approval of the board, establish a phased retirement plan for active members.
- Effective April 1, 2015, the plan rules were amended to allow the purchase of a leave of absence (or period of reduced pay) if a member contributed to a different plan employer or another registered pension plan during the period, subject to ITR limits.
- Effective June 12, 2015, the plan rules were amended to ensure compliance with the ITR and the PBSA by removing the option for a retired member who becomes employed within 60 days of the

¹ Considering their significance, the plan rule amendments required as a result of the implementation of the *Pension Benefits Standards Act*, effective September 30, 2015, and related to plan design, effective January 1, 2016, are included in the summary even if they are effective past the valuation date of August 31, 2015.

granting of their pension by a plan employer to elect to repay to the pension fund all pension amounts received and resume contributions in the Plan.

- Effective September 30, 2015, the plan rules were amended to ensure compliance with the enactment of the new PBSA and Regulation as follows:
 - to reflect the requirement for immediate vesting of pension entitlements for all plan members terminating on or after September 30, 2015, which requires that a vested pension is payable on termination or death¹ for members with less than 2 years of contributory service (although the Plan provisions provide for the greater of a refund of contributions or the value of the vested pension);
 - to establish a member's entitlement to unlock pension benefits based on a medical practitioner's certification the member has an illness or disability that is terminal or to likely shorten their life expectancy;
 - to reflect the simplification of the test for unlocking small benefit payments now determined solely on the basis of a threshold amount of 20 per cent of the YMPE for the calendar year in which the most recent calculation of the commuted value was made;
 - to clarify that a refund of member's contributions, where payable, includes interest at the refund interest rates and that such a refund may be transferred to an RRSP subject to the ITA;
 - to clarify that voluntary contributions in the Retirement Annuity Account must receive interest at the fund interest rates when converted to a monthly pension or paid as a refund, and that the payment of the refund may be transferred to an RRSP;
 - to clarify that reduced pension benefits must at least be equal to the actuarial present value of the pension payable at normal retirement age;
 - to clarify that when a valid spousal waiver has been filed in no case is the surviving spouse entitled to receive a pre-retirement death benefit as a designated beneficiary; and
 - to comply with the requirement that the terms of the plan text reflect relevant terms of the PBSA by adding or updating the following definitions: *active member, employer, insurance company, member, spouse and termination of employment.*

- Effective January 1, 2016, the plan rules were amended to implement plan design changes as follows:

¹ Prior to September 30, 2015, in certain cases, plan members with less than 2 years of contributory service were only entitled to a refund of contributions on termination or death.

- to increase the pension accrual rate on earnings below the YMPE from 1.7 per cent to 2 per cent for pensionable service accrued after December 31, 2015 (a member's entitlement to a bridge benefit solely applies to pensionable service accrued before January 1, 2016);
- to remove the integration of member and employer contribution rates with the YMPE as follows:
 - member contribution rates are updated to a single rate of 8.39 per cent of salary for earnings below and above the YMPE instead of 8.22 per cent of salary for earnings below the YMPE and 8.97 per cent of salary for earnings above the YMPE for contributions to the Basic Account; and
 - employer contribution rates are updated to a single rate of 8.49 per cent of salary for earnings below and above the YMPE instead of 8.32 per cent of salary for earnings below the YMPE and 9.07 per cent of salary for earnings above the YMPE for contributions to the Basic Account;
- to increase member and employer contribution rates for contributions to the Inflation Adjustment Account from 1.38 per cent to 1.47 per cent of salary;
- to increase the early retirement reduction rate for service accrued after December 31, 2015, to 3 per cent per year below age 65 for all members, except for members who have reached age 55 and have at least 35 years of contributory service as they are entitled to an unreduced retirement benefit; and
- to provide that a member who becomes totally and permanently disabled before reaching age 65 may apply to receive a disability benefit, and to clarify that this benefit is not subject to early retirement reduction and continues to be paid to the member after they reach age 65, whether or not they remain totally and permanently disabled, unless they return to work.

Effective April 1, 2016, member and employer contribution rates to the Inflation Adjustment Account were increased to 1.57 per cent of salary each.

The main provisions of the Plan taken into account in the valuation as at August 31, 2015, are summarized below. Except as otherwise noted, the section references are to the College Pension Plan Rules as at January 1, 2016.

Employer and Employee Eligibility

The Plan applies to a body designated under the *College and Institute Act*, and to any other body designated as an employer, on terms and conditions of eligibility specified by the Board. [Section 2]

Participation is compulsory for all members of the senior administrative staff and staff providing educational services (including librarians) who are full-time or who earn more than 50 per cent of the YMPE under the

Canada Pension Plan in any calendar year. Enrolment is optional for eligible staff who are part-time and have not yet earned 50 per cent of the YMPE in a calendar year; enrolment is also optional for educational staff who were hired before September 1, 1999. [Section 3]

Member Contributions

Section 5 defines the following contributions which are deducted from a member's salary during a calendar year, effective January 1, 2016:

- (a) 8.39 per cent of the member's salary (paid into the Basic Account); and
- (b) 1.47 per cent of the member's salary (paid into the Inflation Adjustment Account).

Previously, member contributions ceased after 35 years of pensionable service have been accrued. This limit was removed effective September 1, 2009.

Effective April 1, 2016, member contributions paid to the Inflation Adjustment Account increased to 1.57 per cent of the member's salary.

Employer Contributions

Section 6 requires every employer to contribute the following amounts during a calendar year, effective January 1, 2016:

- (a) 8.49 per cent of the member's salary (paid into the Basic Account); and
- (b) 1.47 per cent of the member's salary (paid into the Inflation Adjustment Account).

Prior to September 1, 2009, no contributions were made by the employer in respect of members whose accrued service exceeded 35 years. This limit was lifted effective September 1, 2009.

Effective April 1, 2016, employer contributions paid to the Inflation Adjustment Account increased to 1.57 per cent of the member's salary.

Funding

Section 12 of the College Pension Plan Joint Trust Agreement provides that the Plan funding must comply with the PBSA requirements for a going-concern valuation. Further, future contribution rate changes indicated by a valuation must be shared equally between employers and members.

Retirement Benefits: Eligibility Conditions for Pension

Section 50 provides that an active member who, on or after September 30, 2015, terminates employment is, on application, eligible to receive an unreduced pension calculated in accordance with sections 54 and 55 if the member has:

In respect of service prior to January 1, 2016:

- (a) attained age 55 and completed at least 35 years of contributory service;
- (b) attained age 60 with at least 2 years of contributory service; or
- (c) attained age 65.

In respect of service on or after January 1, 2016:

- (a) attained age 55 and completed at least 35 years of contributory service;
- (b) attained age 65.

A reduced pension is otherwise provided where the terminating member had reached age 55.

An active member who terminated employment prior to September 30, 2015, is entitled, upon application, to an unreduced pension if the member had:

- (a) attained age 55 and completed at least 35 years of contributory service;
- (b) attained age 60 with at least 2 years of contributory service; or
- (c) attained age 65.

A reduced pension is provided to such a terminating member who had reached age 55 and completed at least 2 years of contributory service, or attained age 60 but had not completed 2 years of contributory service.

Under certain conditions, the contributory service requirements mentioned above can include service during certain periods of child rearing.

Section 78 (4) provides that, before authorizing the payment of an immediate pension, the plan administrator may require a member and their employer to declare that no pre-arrangement to return to work with the same employer existed at the time of termination of employment.

Calculation of Unreduced Pension

Section 54 provides that the unreduced lifetime monthly pension payable to a member terminating employment on or after January 1, 2002, in the form of a single life annuity guaranteed for 10 years (the "normal form"), is calculated as the sum of the following:

- (a) 2 per cent of the member's highest average salary multiplied by the number of years of pensionable service accrued before January 1, 1966;
- (b) 1.7 per cent of the lesser of
 - (i) the member's highest average salary; and
 - (ii) $1/12$ of the YMPE for the calendar year immediately before the effective date of the pension;multiplied by the number of years of pensionable service accrued after December 31, 1965 and before January 1, 2016¹;
- (c) 2 per cent of the excess of the member's highest average salary over the amount determined under paragraph (b) (ii), multiplied by the number of years of pensionable service accrued after December 31, 1965 and before January 1, 2016¹; and
- (d) 2 per cent of the member's highest average salary multiplied by the number of years of pensionable service accrued after December 31, 2015.

In addition, the member is entitled to a monthly benefit, payable until the earlier of the death of the member and the member reaching age 65, that is:

- (a) 0.3 per cent of the lesser of
 - (i) the member's highest average salary; and
 - (ii) $1/12$ of the YMPE for the calendar year immediately before the effective date of the pensionmultiplied by
- (b) the number of years of pensionable service accrued after December 31, 1965 and before January 1, 2016¹.

(Prior to January 1, 1999, pensions were calculated under a 1.3 per cent/0.7 per cent lifetime/bridge formula for service accrued on or after January 1, 1966. This benefit formula was amended to 1.35 per cent/0.65 per cent for plan members terminating employment between January 1, 1999 to December 31, 2001. The YMPE integrated benefit formula of 1.7 per cent/0.3 per cent applies to plan members who terminated

¹ Prior to September 1, 2009, service was limited to 35 years.

employment on or after January 1, 2002, with respect to pensionable service accrued after December 31, 1965 and before January 1, 2016, whereas the non-YMPE integrated benefit formula of 2 per cent applies with respect to pensionable service accrued by plan members after December 31, 2015.)

Highest average salary means one-twelfth of the average annual salary earned by a member during the 5 years of pensionable service (not necessarily consecutive) in which the salaries were highest (or, if the member has accrued less than 5 years of pensionable service, the total number of years and partial years of pensionable service). [Part 2 Division 2]

The calculation of the pension payable to a deferred member who terminated employment on or after January 1, 2002, and who is entitled to an unreduced pension is detailed in section 54. The pension is calculated on the basis of the single life guaranteed option with a term of 10 years using a benefit formula of 1.7 per cent/0.3 per cent for service accrued up to December 31, 2015 and a benefit formula of 2 per cent for service accrued after December 31, 2015.

Section 45 stipulates that the pension payable to a deferred member who terminated prior to January 1, 2002 will be based on the rules in force at the date of termination.

Accordingly, a member who terminated prior to January 1, 2002, but after January 1, 1999 will receive a pension on the basis of a single life guaranteed option with a term of 10 years, but using a benefit formula of 1.35 per cent/0.65 per cent.

A member who terminated prior to January 1, 1999 will receive a pension in the form of a single life annuity (no guarantee), using a benefit formula of 1.3 per cent/0.7 per cent

A member who has made voluntary additional contributions in the past (these are no longer accepted) will be granted an additional pension or may take a refund, including interest at fund interest rates on those contributions.

Calculation of Reduced Retirement Benefit

Section 55 (1) provides that if a member referred to in section 45 (1) or section 50 terminated employment on or after January 1, 2002 and, on the effective date of the members' pension, the member has not either attained age 65 or age 55 and completed at least 35 years of contributory service, the lifetime and bridge benefits payable to the member need to be reduced as follows:

- (a) for pensionable service accrued prior to January 1, 2016:
 - (i) sections 55 (2) and 55 (5) provide that if the member has not reached age 60 and has completed 2 years of contributory service, the benefits are reduced by a percentage equal to 3 per cent for each year of age by which the member is less than age 60, unless the member while an active member did not reach age 50, did not complete 10 years of contributory

service or did not complete at least 8 months of contributory service in the 24 months preceding their termination of employment, in which case a percentage equal to 5 per cent applies;

- (ii) section 55 (3) provides that if the member has reached age 60 and completed 2 years of contributory service, the benefits are paid without reduction; and
 - (iii) section 55 (4) provides that if the member has reached age 60 and has not completed 2 years of contributory service, the benefits are reduced by a percentage equal to 5 per cent for each year of age by which the member is less than age 65;
- (b) for pensionable service accrued after December 31, 2015, section 55 (6) provides the benefits are reduced by a percentage equal to 3 per cent for each year of age by which the member is less than age 65.

Where a pension is reduced the reduction is prorated for fractions of years.

Section 55 (8) provides that a reduced pension benefit must have an actuarial present value that is at least equal to the actuarial present value of the pension benefit payable at normal retirement age.

In the case of members who terminated employment on or after January 1, 2002 and prior to January 1, 2016, lifetime and bridge benefits are reduced as outlined above under point (a).

Alternative Types of Pensions

Section 56 provides that a pension may be granted on the single life plan with a guaranteed period (5, 10 or 15 years), joint life and last survivor plan with a guaranteed period (5, 10 or 15 years), temporary life plan or a combination of these plans with the approval of the plan administrator. The amount of any pension granted on a form other than the normal form is calculated on an actuarially equivalent basis.

Where a member has a spouse at retirement, the member is required to elect a 60 per cent joint life and last survivor plan, unless the spouse waives this requirement in writing or there is a written agreement or court order made under Part 5 or 6 of the *Family Law Act* that is filed with the plan administrator. This option provides for a reduced amount payable to the member, continuing to the spouse on death of the member at 60 per cent of the initial reduced amount. A spouse is as defined in the PBSA, and includes a common-law or same-sex spouse.

Disability Pensions

Section 60 provides that a member is entitled upon application to a disability pension if the member, before reaching age 65, is totally and permanently disabled, has completed 2 years of contributory service and is not eligible for a monthly income benefit from a group disability plan. Despite the above provisions, a

member who has received a lump sum payment instead of a monthly income benefit under a group disability plan is not eligible to receive a disability pension.

The disability pension is equal to the full unreduced lifetime portion of the pension (i.e. there is no additional bridge pension to age 65) earned to the date of disability.

Part 6 outlines the application process for a disability pension.

Sections 12 (5) and 99 (2) provide that if a member is receiving a monthly income benefit from an approved group disability plan, the member and employer do not make contributions and the member is not entitled to a pension under the Plan, but the period for which the member receives such group disability income benefit is considered pensionable service, with the final pension based on the highest average salary at disablement increased to retirement in accordance with changes in the consumer price index.

Shortened Life Expectancy Benefits

Part 6.1 establishes a member's entitlement to benefits in the event of shortened life. Under this part, a member entitled to receive a benefit from the Plan and having an illness or disability that is certified by a medical practitioner to be terminal or likely to shorten the member's life considerably may, subject to and in accordance to the Pension Benefits Standards Regulation, elect to convert all or part of their benefit to a series of payments for a fixed term or to receive a lump sum equal to or of a lesser amount to the commuted value of the benefit.

Payments made to the member subsequent to a payment made under this part will be actuarially reduced to reflect that payment.

Pre-retirement Death Benefits

The pre-retirement death benefits for active and inactive plan members who die, on or after September 30, 2015, are covered in section 69 as follows:

- (a) if there is no surviving spouse or a valid spousal waiver has been filed, the benefit payable to the beneficiary is a payment of the greater of a refund of member's contributions with interest and the full commuted value of the regular pension earned to the date of death. If a spousal waiver has been filed, the surviving spouse cannot be designated as beneficiary.
- (b) if the member has not attained age 55 at the date of death, and there is a surviving spouse and a valid spousal waiver has not been filed, the spouse may elect to receive as a benefit either of the following:
 - (i) the greater of a refund of member's contributions with interest and the full commuted value of the regular pension earned to the date of death; and

- (ii) an immediate pension that is actuarially equivalent to the full commuted value of the regular pension earned to the date of death.
- (c) if the member has attained age 55 on the date of death, and there is a surviving spouse and a valid spousal waiver has not been filed, then the benefit is an immediate pension to the spouse that is actuarially equivalent to the full commuted value of the regular pension earned to the date of death.

If a member terminated employment under the previous vesting and locking-in rules, left contributions on deposit and dies before taking a benefit from the Plan, the contributory service requirement in place at the time of termination (i.e. 10 years, 5 years or 2 years) is used to determine benefit eligibility.

For periods on and after January 1, 2004, interest credits for member's contribution are based on the average yields of 5 year personal fixed term chartered bank deposit rates, published in the Bank of Canada Review as CANSIM Series V122515.

Refunds, Vesting and Portability

Under sections 42 (1) (b) and 45, a terminating member is entitled to a deferred pension equal to the full normal pension accrued to the date of termination; this may be paid on a reduced basis at an early retirement age depending on the service to termination - see above "Eligibility conditions for pension" section.

Sections 42 (1) (c) and 46 provide for the payment of a lump-sum commuted value in lieu of the deferred pension, if the member has not attained age 55, subject to the commuted value being payable on a locked-in basis. Under certain limited conditions (small pensions, or small commuted values) the PBSA permits the election of a lump-sum payout, regardless of age, and on a non-locked-in basis.

Section 100 provides that the deferred vested pension of a terminating member is based on the highest average salary at termination, increased to retirement by the percentage increase granted to pensions for the period between the month of termination and the month the pension becomes effective¹.

Section 75 (3) (h) provides that the cost of the indexing described above is funded from the Inflation Adjustment Account.

A member who terminated employment under age 60 with less than 2 years of contributory service on or after April 1, 2000 and before September 30, 2015, may receive a refund of their contributions plus interest. For periods on and after January 1, 2004, interest credits are based on the average yields of 5 year personal fixed term chartered bank deposit rates, published in the Bank of Canada Review as CANSIM Series V122515.

¹ For increases prior to December 31, 1980, the increase in the highest average salary is in accordance with changes in the pension index.

Cost of Living Benefits (Indexing)

Section 73 sets out how cost of living benefits are to be administered. It provides for increases to retired members on January 1 of each year, with the benefits funded from the Inflation Adjustment Account. The benefit is based on the total amount of pension being received, including previous cost of living increases, less any portion of the pension that is a result of voluntary contributions (which are no longer permitted) and/or any temporary life annuity arising as a result of converting some or all of the regular pension to one of the optional forms, if the temporary annuity commenced before January 1, 2006. (The bridge pension to age 65, payable as part of the regular pension formula, is subject to indexing increases.)

Indexing granted on and after January 1, 2011 is calculated as the lesser of:

- (a) the percentage change in the average CPI for the 12 months ending October 31 over the highest average CPI for any previous 12 month period ending October 31, and
- (b) the sustainable indexing rate, which is to be recommended by the actuary during the triennial valuation and is subject to the approval of the board,

provided there are sufficient funds in the IAA to meet the cost of the increase.

Pensions will not be reduced in years of deflation. In years immediately following a period of deflation, pensions will only be increased as described above once there is net positive inflation over the period since the pensions were last increased.

Section 73 sets out additional requirements with regards to the cost of living benefit, including:

- (a) the same uniform percentage increase will be granted in respect of all pensions eligible for adjustment;
- (b) the increase is prorated if the pension has not been in payment for at least 12 months;
- (c) the total capitalized value of all cost of living benefits granted on January 1 must not exceed the amount in the Inflation Adjustment Account on the preceding September 30; and
- (d) the capitalized value of all cost of living benefits granted annually is transferred from the Inflation Adjustment account to the Basic Account.

The Fund

Section 75 provides that the Pension Fund is divided into the following four accounts:

- (a) the **Basic Account**, consisting of all the assets in the fund other than assets in the Inflation Adjustment Account, the Supplemental Benefits Account and the Retirement Annuity Account;
- (b) the **Inflation Adjustment Account**, consisting of:

- (i) the 1.47 per cent contribution by each of the members under section 5 (1) (c);
- (ii) the matching employer contributions under section 6 (1) (c);
- (iii) the net investment income earned on the Inflation Adjustment Account; and
- (iv) the income, as determined by the plan administrative agent, that is earned on other fund assets held in the Basic Account in respect of pensions being paid and that is in excess of the investment return anticipated in the most recent actuarial valuation;

less:

- (v) amounts transferred to the Basic Account in respect of capitalized cost of living benefits granted under section 73 and 88;
- (vi) refunds to plan members in respect of the 1.47 per cent contribution made to this account under section 5 (1) (c), or amounts otherwise transferred out of this account in respect of member and employer contributions allocated to this account;
- (vii) amounts determined by the plan administrative agent in respect of the portions of commuted value payments or other transfers out of the Plan that are attributable to cost of living adjustments;
- (viii) amounts transferred to the Basic Account that are equal to the capitalized value of increases in deferred pensions resulting from increases in highest average salaries under section 100; and
- (ix) amounts transferred to the Supplemental Benefits Account, if any, as specified by the board;

(Section 12 (3) of the JTA also permits the Board to transfer portions of any actuarial surplus in the Basic Account to the IAA.)

- (c) the **Supplemental Benefits Account**, consisting of assets required for the administration and payment of benefits that are non-registrable under the *Income Tax Act*; and
- (d) the **Retirement Annuity Account**, consisting of voluntary contributions made under the previous statutes, and interest earnings thereon.

Income Tax Act Limits

The *Income Tax Act* imposes certain limits on the contributions that may be made to, and the benefits that may be paid from, a registered pension plan. However, in total, the contribution requirements from, and the benefit promises to plan members have not been altered under the Plan. To this end, a Supplemental Benefits Account has been created to cover the financing and payment of benefits in excess of those registrable under the *Income Tax Act*.

The excess benefits are paid on a current cash basis, by allocating from the regular employer contributions, the amounts necessary to maintain the Supplemental Benefits Account at a zero balance. Effectively, from a plan member's perspective, it is expected that these procedures will be invisible - the total contribution and benefit obligations remain unchanged. We have ignored the implications of all such internal restructuring in completing the primary, Basic Account valuation. In the plan summary herein, and elsewhere in this valuation report, our references to contributions/benefits to/from the Basic/Inflation Adjustment Accounts are inclusive of the allocations to/from the Supplemental Benefits Account; in general, the allocations to/from the Supplemental Benefits Account have not been referenced.

We have also completed supplementary funding valuations recognizing the income tax limits on pensions. We understand that these limits are applied only in respect of service after 1991. The maximum annual pension permitted (before application of any early retirement reductions, where applicable) is the lesser of:

- (i) \$2,819 (for 2015) multiplied by the years of service; and
- (ii) 2 per cent multiplied by the years of service further multiplied by the average of the best 3 years of remuneration paid to the member.

Under the income tax rules, the flat \$2,819 limit will be automatically indexed each year.

Other Items

1. The College Pension Plan Post Retirement Group Benefit Rules, made under article 13 of the JTA, set out the non-pension (i.e., group) benefits that are provided for retired members. These post-retirement group benefit rules replaced the College Pension Plan Post Retirement Group Benefit Regulation, B.C. Reg. 490/2003, effective June 22, 2012.

Effective September 1, 2009, the member is responsible for paying 100 per cent of the premium for extended health and dental benefits. Previously, the cost of those benefits was carved out from employer contributions to the IAA. This carve out was limited to a maximum of 1 per cent of pensionable salary (out of the total employer IAA contribution at that time of 1.09 per cent).

Effective April 1, 2004, the member is responsible for paying 100 per cent of the premiums for coverage under the Medical Services Plan ("MSP").

2. Section 9 of the JTA provides that all expenses incurred in the administration of the Plan are to be paid from the fund.
3. A maximum of 5 years taken to raise a child may be recognized in establishing eligibility for a pension provided the member has a record of pensionable service immediately before and after the child-rearing period(s). [Section 13]

4. Section 57 enables an employer to request the plan administrative agent to adopt a Special Retirement Incentive Plan (SRIP), whereby the age and service conditions, or the early retirement percentage reductions, or both, may be adjusted. Where the plan administrative agent agrees, the administrative agent must also determine the members eligible for the SRIP, the period it remains open, the conditions applicable to the incentives, the additional costs to the employer, and the timing of these payments to fund the SRIP.

5. In 1999, the definitions of, and references to, approved and reciprocal employers were removed from the Plan by Bill 18 (1997), to comply with *Income Tax Act* requirements. In general, these provisions allowed for portability among various plans (mostly the four public sector plans in B. C.), whereby service and salaries were commonly recognized in all of the plans. The arrangements for the four public sector plans in B. C. were replaced by a transfer of reserve agreement, whereby the plan member could elect to have a reserve transferred and then be covered for full service by the rules of the importing plan. The College Pension Plan withdrew from the Interplan Pension Transfer Agreement effective October 31, 2002 and negotiated three separate "bilateral" agreements with the Municipal, Public Service and Teachers' Pension Plans. On April 1, 2004, these "bilateral" service transfer agreements with the Municipal, Public Service and Teachers' Pension Plans were replaced with the Public Sector Transfer Agreement.

Effective April 1, 2010, reciprocal transfers between the College, Municipal, Public Service and Teachers' Pension Plans are made exclusively under the National Public Service Pension Transfer Agreement (NTA). Under the NTA, as with the Public Sector Transfer Agreement (and the previous bilateral agreements), if the importing plan's benefits are more generous, the transferred service is pro-rated based on each plan's benefits. Members may pay for any shortfall, subject to CRA approval, within deadlines set by the plans. Members can also choose to leave their entitlements with their respective plans and apply for the appropriate benefits available from each plan at termination and/or retirement.

Appendix B: Actuarial Methods and Assumptions

The significant actuarial assumptions are summarized below.

	Funding Valuation	Sustainable Indexing Valuation
Investment Return	6.25% p.a. (6.5% previous valuation)	6.5% p.a. (6.75% previous valuation)
General Salary Increases	3.5% p.a. (3.75% previous valuation)	3.25% p.a. (3.5% previous valuation)
Seniority Salary Increases	Annual percentages varying by age and sex	Same
CPI Increases	2.75% p.a. (3.00% previous valuation)	2.5% p.a. (2.75% previous valuation)
Pension Indexing	<ul style="list-style-type: none"> Future indexing of pensions and deferred pensions ignored, as will be covered by Inflation Adjustment Account Future indexing (by inflation) of wage base for disability accruals assumed to be a charge to the Basic Account and to be 2.75% p. a. (3.0% in the previous valuation) Indexing to date is capitalized and forms part of pension liability 	<ul style="list-style-type: none"> Future indexing of pensions and deferred pensions at “Sustainable Indexing Rate” – This rate is calculated and is the primary output of this valuation Future indexing (by inflation) of wage base for disability accruals assumed to be a charge to the Basic Account and to be 2.5% p.a. (2.75% in the previous valuation) Indexing to date is capitalized and forms part of pension liability
Asset Values	<ul style="list-style-type: none"> Assets carried at smoothed market values Smoothed value restricted to a range of 92% to 108% of Market Value (range of 90% to 110% previous valuation) 	<ul style="list-style-type: none"> Assets carried at smoothed market values Smoothed value restricted to a range of 95% to 105% of Market Value
Costing Method	<ul style="list-style-type: none"> Contributions are based on an entry-age funding approach 	<ul style="list-style-type: none"> Required contributions are based on an entry-age funding approach Contributions are set equal to the funding valuation basic normal cost plus IAA contributions.

More detail with respect to the above, detail with respect to other assumptions, and comparisons with assumptions and approaches in the previous valuation follow.

1. Actuarial Methods

The plan has been valued on a going-concern basis, which assumes that the plan will continue to operate indefinitely. The basis is used to estimate the funded position of the Plan, and to estimate the contributions required to be made to the Plan's fund.

The methodology used to calculate the valuation liabilities shown in the statement of actuarial position was as follows:

The liability for current pensioners and active members was calculated by projecting the benefit payments to be made to those persons and to their eligible spouses using the actuarial assumptions described below and then discounting those projected payments to the valuation date at the investment return assumption.

The liability for members currently receiving benefits from a long-term disability plan was calculated as if they would continue to earn service credits and ultimately receive a pension from the Plan.

The liability for the inactive group was calculated on the assumption that a proportion (based on present working status, contribution balance, length of credited service and date of last contribution) would again become contributing members of the Plan and a further proportion (based on similar, but different, criteria) would collect deferred vested pensions. The liability for the remaining inactive members was calculated as twice their accumulated refund values.

In order to test the adequacy of the current contribution rates, we calculated the required member/employer contribution rate for current service in accordance with the entry-age actuarial cost method, based on the data for those members who joined the plan in the last five years prior to the valuation date (previously we used the data for those who had less than five years of contributory service at the valuation date – the reason for the change was to avoid potential distortions to the new entrant profile due to part-time members with limited service) and the actuarial assumptions described below. This method produces the level rate of the member/employer contributions sufficient to provide the benefits for the average future new entrants to the plan. The cost so determined is also referred to as the normal actuarial cost and is calculated on an aggregate basis for all entrants as a level percentage of payroll.

The valuation assets consist of:

- (i) The Basic Account; and
- (ii) The present value of future member and employer contributions at the entry-age normal cost rates, for the closed active group, for the basic non-indexed benefits.
- (iii) The present value of any existing amortization requirements established at previous valuations.

The unfunded actuarial liability is equal to the excess of the valuation liabilities over the valuation assets. If the assets exceed the liabilities, then the difference between them gives rise to an actuarial surplus. Additional payments, in excess of these normal actuarial costs, required to amortize this unfunded liability/surplus were then determined, as a percentage of payroll, as follows:

- (1) If the result is an unfunded liability amortize it over the 15 year period commencing September 1, 2015¹; and
- (2) If the result is a surplus (the result of a gain since the last valuation), apply the gain to amortize or reduce the previously identified unfunded liabilities, starting with the oldest established. If, after removing all previously established amortization amounts there is still a surplus, first set aside a rate stabilization reserve equal to 5% of the net liability, and then amortize any surplus in excess of that amount over 25 years and 15 years to obtain the reference rates required by the funding policy.

The required contributions are the sum of the normal actuarial cost and the amounts required to amortize the unfunded actuarial liability/surplus.

For simplicity, we have assumed that the benefit and contribution changes effective January 1, 2016 (and April 1, 2016 of IAA contributions) applied as at the August 31, 2015 valuation date. As the costs of the previous and revised benefits are substantially the same, this will have an immaterial effect on the valuation results.

The actuarial procedures followed are substantially the same as those in the previous valuation.

¹ We use an unadjusted 15 year rolling amortization period for the supplementary indexed valuation.

2. Treatment of Member and Pensioner Data

Data as of August 31, 2015 were prepared by the Pension Corporation for 13,554 active members, 6,541 pensioners, 253 members receiving benefits from a long-term disability plan, 5,170 inactive members plus a further 16 non-retired individuals with very limited data, 3,597 active member terminations and 272 pensioner terminations during the period September 1, 2012 to August 31, 2015. The Pension Corporation advised us that the data supplied are generally proper, complete and in accordance with specifications, unless otherwise noted.

Where possible, we compared totals with corresponding details in the Plan's audited Annual Reports. We also subjected the data to a number of tests of reasonableness and consistency, including the following:

- A member's (and partner's as applicable) age is within a reasonable range;
- A member's gender or date of birth did not change;
- A member joined the plan or commenced pension at a reasonable age;
- Accrued service increased by a reasonable amount (e.g. no more than 36 months since the last valuation and no more than 12 months in the valuation year);
- The salary level and the salary increase from the previous valuation was within a reasonable range;
- Pensions in pay increased by a reasonable amount (e.g. in line with the indexation since the last valuation); and
- We examined the additions to and deletions from each of the data files (i.e., the files for active employees, pensioners and terminated members) since the previous valuation to determine whether all Plan members were accounted for in this valuation, to check for duplicate records and to confirm pension amounts.

There were a number of discrepancies recorded during our examination of the data and we sought clarification of these from the Pension Corporation. Where necessary, we modified the data, our assumptions, or both, to compensate for these discrepancies.

The active member data includes a number of individuals who work less than full time. For the purposes of calculating liabilities and normal actuarial costs, we treated all members as if they were full-time employees after the valuation date; however, in calculating the amortization costs as a percentage of total future payrolls, we reduced the total payroll base by 10% to reflect the part-time employment (the same adjustment was applied at the previous valuation).

The active member data included 2,606 persons who had no salary or service reported for the year ending August 31, 2015, or with a last-contribution-date prior to August 2015. We excluded them from the active member base, and have included them with the inactive data, holding a liability for 445 of them (those with at

least 3 years of service and a basic employee contributions with interest balance of at least \$1,500) as if they would be reactivated on August 31, 2015 (we set their salaries equal to the average salaries for active members in the same age-sex category). We held a liability equal to twice the basic employee contributions with interest balance for the remaining 2,161 persons. A similar approach was used in the previous valuation.

Salary details were inappropriate (missing, very low, or very high) for 22 active members. We assumed that these 22 members had the same average earnings as for other actives in the same age-sex category.

The liability for 246 of the members on long-term disability was calculated as if these individuals would ultimately collect deferred vested pensions starting at age 63, with deferred pensions on the basis of service projected to retirement date and the actual salaries indexed to the valuation date (where the actual salary detail shown for those members was inappropriate, we used the average salaries for active members in the same age-sex category). We excluded 7 long-term disability members from the valuation because of missing, invalid or inconsistent detail. Liabilities of twice their basic employee contributions with interest balance were held for these members. A similar approach was used in the previous valuation.

We divided the 5,170 inactive members into two classes:

- (i) Those with missing, invalid or inconsistent detail, or whose accrued pension equal to zero, or who were known to have taken a refund after the valuation date, and
- (ii) All other inactive members.

We calculated liabilities for the second group on the assumption that 100% of this group would receive vested pensions. The liability for the first group was held as twice their basic employee contributions with interest balance. In the previous valuation, inactive members whose basic employee contribution with interest balance was less than \$1,500 were included in the first group.

With respect to the 16 remaining non-retired members with limited data, we held a liability equal to twice their basic employee contributions with interest balance.

The data from the Pension Corporation and our treatment of this data is summarised below. Further details on the active member data, the new entrant groups on which our entry-age costs are based, the inactive member data and the pensioner data are summarized in Appendices C, D and E.

	Pension Corp. Data	Valuation Treatment						
		Pensioners	Pensioner with zero liability	Active Members	Long Term Disability	Vested	Reactivate	Refund 2 x CWI ¹
Pensioners	6,541	6,530	11					
Active Members	13,554			10,948			445	2,161
Long Term Disability	253				246			7
Terminated Vested	5,170					5,001		169
Limited data	16							16
Total membership	25,534	6,530	11	10,948	246	5,001	445	2,353

3. Actuarial Assumptions

Investment Return and General Salary Increase Rates

Our actuarial costing method involves projecting future benefit disbursements and contribution and investment income. In such projections, the most significant assumptions are those that are made for the future rates of return to be earned by the fund and future general salary increases (which are across-the-board increases applying to employees regardless of service, rank or position).

(a) Funding Valuation - Excess Investment Return Threshold

The Funding Valuation investment return assumption is also significant for another reason. Since 1980, the provisions of the Plan relating to the indexing of pensions provide that the income to be credited to the Inflation Adjustment Account in respect of pensions being paid is determined by reference to the amount in excess of the investment return anticipated in the most recent actuarial valuation. A decrease in the investment return assumption, and hence in the excess return threshold, would have at least two effects:

- (i) it would increase the amount of excess investment return allocated to the IAA, and hence increase the potential for future indexing; and
- (ii) it would increase the costs of the basic non-indexed plan, provided benefit levels are not changed.

An increase in the investment return assumption would have the opposite effects. In this context, the excess investment return threshold takes on benefit design connotations as well, and thus consistency in the assumptions, from one valuation to the next, takes on added significance.

¹ Contributions with interest.

The previous valuation used a long-term investment return assumption of 6.5% per annum. As noted earlier, this also became the threshold rate used to determine excess investment return transfers to the IAA during the post-retirement period; effectively, this is the same as saying that the Basic Account will only earn a rate of 6.5% per annum during the post-retirement period.

(b) Actual Returns and Asset Mix

We have calculated market value returns on the total fund (i.e. Basic plus IAA), including non-invested assets (i.e. receivables, net of payables), net of investment-related expenses, and assuming that all cash flows occur at mid year, as 10.45% for 2013, 17.5% for 2014 and 7.35% for 2015. At August 31, 2015, approximately 61% of the total portfolio was invested in equities (including private placements), a further 13% in real estate, and the balance of 26% in fixed income (including mortgages).

(c) Expected Returns

After examining the net average investment return earned by the fund's investments, the yield on investments made in recent years, the likely future trend of investment returns in general, the investment practices, and the provisions of this Plan - e.g. the allocation of excess investment income to the Inflation Adjustment Account - we have concluded that a reasonable best estimate of the long term investment return on the plan's assets is 6.50% (which was reduced from 6.75% in the previous valuation). We also concluded that a reasonable best estimate of the real return on the assets, i.e., the investment return in excess of inflation, is 4% (no change from the previous valuation).

In setting the Funding Valuation assumptions, it is necessary to reduce these expected returns by a margin, so that the resulting liabilities have a suitable provision for adverse deviations. Following discussions with the Board regarding the appropriate adjustments to the best estimate assumptions and taking into account the requirements of the Board's funding policy, for the purposes of this valuation we decreased our long-term investment return assumption to 6.25% per annum. We also continued with our previous valuation assumption for the real return of 3.5%. In other words, there is a margin of 0.25% on the investment return assumption, and a margin of 0.5% on the real return assumption (no change in the margins compared to our previous valuation).

The following table shows the development of the investment return assumption:

	Discount rate
Weighted average return	6.46%
Diversification and rebalancing effect	0.30%
Provision for investment related expenses	(0.25%)
Rounding	(0.01%)
Estimated net investment return before margin	6.50%
Margin for adverse deviation	(0.25%)
Discount return assumption (rounded to nearest 0.25%)	6.25%

To determine the going concern discount rate, our model determined expected long term capital market returns, standard deviations and correlations for each major asset class by using historic returns, current yields and forecasts. We then stochastically generated projected asset class returns for 1,000 paths over 20 years to create expected returns for each major asset class and applied these to the Plan's target asset mix.

For the purposes of establishing the discount rate used in this report, we have assumed that there will be no added-value returns from employing an active management strategy in excess of the associated additional investment management fees. The investment expense allowance of 0.25% provides for expected future management fees.

As the sustainable indexing target is not guaranteed, and the primary objective of the sustainable indexing approach is to improve intergenerational equity, it is not appropriate to include margins in the sustainable indexing basis. The Sustainable Indexing Valuation therefore assumed a nominal investment return of 6.50% and real investment return of 4.0%.

(d) Real Return and Salary Relationships - Derive Salary Assumption

The 6.50% investment return assumption used in the 2012 valuation was viewed as consisting of a real return component of about 3.50% per annum plus a long-term underlying inflation assumption of about 3.0% per annum. Continuing with the same real return component of 3.50% and applying it to the new 6.25% investment return assumption, we get a revised long-term underlying inflation assumption of 2.75% per annum (i.e. 6.25% - 3.50%). This can also be viewed as a best estimate of future inflation of 2.50% (derived from the best estimate nominal return assumption of 6.50% less the best estimate real return assumption of 4.0%), plus a margin for adverse deviations of 0.25%.

The general salary increase assumption used in the 2012 valuation was 3.75% per annum. This was viewed as consisting of the underlying inflation assumption of 3.0% per annum, plus a real salary increase component of 0.75% per annum. For this valuation, when the real salary increase assumption of 0.75% is added to the revised underlying inflation assumption of 2.75%, we get a revised general salary increase

assumption of 3.50%. The real salary increase assumption of 0.75% consists of a best estimate of real salary increases of 0.50%, plus a margin for adverse deviations of 0.25%.

For the Sustainable Indexing Valuation, the general salary increase assumption is 3.25% per annum. This is made up of the best estimate inflation assumption of 2.5% plus real salary increase of 0.75%.

The impact of these assumptions on the Funding Valuation result is discussed further below.

(e) Impact of Investment Return and Salary Assumptions on the Valuation

During the **post-retirement period**, the excess investment return threshold is critical as this is the discount rate for the Basic Account post-retirement liabilities. It also sets the excess investment return threshold which puts a ceiling on the amounts the Basic Account can effectively earn on the portion of the assets that support post-retirement liabilities. For example, if the threshold is 6.25%, then, provided the long-term returns exceed 6.25% on average, all of the excess will be transferred to the IAA, i.e. the Basic Account will only retain 6.25% on these assets.

During the **pre-retirement period**, it is the relationship, i.e. the net difference, between the investment return and general salary increase assumptions that is the key, rather than their absolute levels - projected benefits increase each year by the salary assumption and are then discounted by the investment assumption, i.e. the net result is that the liabilities are effectively being discounted by the net difference between the two assumptions. For example, the long-term assumptions we have used in this valuation (i.e. 6.25% investment return, 3.50% salary, 2.75% underlying inflation) would produce results similar to those using assumptions of 6.50% investment return and 3.75% salary, with 3.0% underlying inflation; or 6.0% investment return and 3.25% salary, with 2.5% underlying inflation, etc. Thus, the underlying inflation assumption itself is not material to the result.

(f) Summary of Interrelationships

The 2012 and 2015 annual investment return and general salary increase assumptions, and their underlying economic interrelationships, are summarized below.

	Funding Valuation		Sustainable Indexing Valuation	
	2015	2012	2015	2012
1. Investment return = excess investment return threshold	6.25%	6.50%	6.50%	6.75%
2. Real return rate	3.50%	3.50%	4.00%	4.00%
3. Implied underlying inflation = 1 - 2	2.75%	3.00%	2.50%	2.75%
4. Real salary increase	0.75%	0.75%	0.75%	0.75%
5. General salary increase = 3 + 4	3.50%	3.75%	3.25%	3.50%

(g) Actual vs. Expected Salaries; Adjust Data Salaries

The 2015 valuation data indicates that average annual earnings increased by about 3.6% from mid-2012 to mid-2015 (i.e. about 1.17% per annum), as compared with an expected increase of about 11.7% (i.e. about 3.75% per annum) on the basis of the assumptions used in the 2012 valuation.

The input data salaries provided to us for this valuation were the annualized earnings during fiscal 2015. We took them without further adjustment as being equal to the salary rates on the valuation date (this may slightly understate the actual salary rates at the valuation date). Thereafter, the assumed rates of salary increase are applied continuously during each future year.

(h) YMPE Increase

We assumed that the YMPE under the Canada Pension Plan would increase at the general salary increase rate (Funding Valuation = 3.50% per year, Sustainable Indexing Valuation = 3.25%) from its 2016 level of \$54,900. In the previous valuation we assumed that the YMPE would increase at a rate of 3.75% per year for Funding Valuation and 3.5% per year for Sustainable Indexing Valuation from its 2013 level of \$51,100.

Pension Indexing**(a) Basic Funding Valuation**

Indexing supplements on and after January 1, 1982 are provided on an annual basis and are limited to those amounts that can be appropriately financed by the balances available in the Inflation Adjustment Account. Thus we do not need to allow for future indexing in our calculations as the costs of this indexing were fixed at 1.38% as of the valuation date, increasing to 1.47% effective January 1, 2016, and to 1.57% effective April 1, 2016 of salaries to be paid by each of the members and the employers. With respect to indexed supplements granted through August 31, 2015, the present values have been included in the actuarial liabilities for pensions in the course of payment and thus form part of the determination of the recommended contribution.

As in the previous valuation, we ignored the future pre-retirement escalation that applies to vested pensions, since the cost of this "indexing" is also charged to the Inflation Adjustment Account.

With regard to the vested pensions of members who have terminated employment, the amounts of deferred pensions quoted to us include indexing during the deferred period to date. We understand that such transfers from the Inflation Adjustment Account do not occur until retirement (theoretically, such transfers should be made on an annual basis as the indexing occurs, so as to reduce the inter-generational transfer of the costs of such indexing). We have therefore adjusted the deferred pension amounts to remove this indexing so that the Basic Account liability is aligned with the allocation of assets between the Basic and IAA accounts. In previous valuations, we made no such adjustment.

The indexing of salaries before retirement in the case of members on long-term disability is, on the other hand, a charge to the Basic Account rather than to the Inflation Adjustment Account. Accordingly, in valuing the deferred pensions for those currently on long-term disability, we have made an allowance for this by applying an escalation assumption (at the full underlying inflation assumption) of 2.75% per annum during the deferral period to retirement.

(b) Sustainable Indexing Valuation

All current and future pensions are assumed to increase at the sustainable indexing level.

For those on long term disability, we allow for escalation in the deferral period at a rate of 2.5% per annum, which equals the best estimate assumption for inflation. In other words, for the sustainable indexing valuation, the escalation assumption does not include the 0.25% margin taken into account in the funding valuation.

Asset Values

The fund's annual reports record assets on a market value basis. We relied on these annual reports for the asset values used for the years ending August 31, 2013 to August 31, 2015.

As in the previous valuation we applied a five year smoothing technique to these assets. We believe a smoothing approach is appropriate as it cushions the actuarial valuation results against dramatic swings in market value that can occur.

To obtain the unconstrained smoothed value, we first determine the actual return on the basis of market values during the year (taking into account the timing of non-investment related cashflows, i.e. the net contributions minus benefits and non-investment expenses). We then determine an assumed return for the year at a rate equal to the assumed underlying real return rate plus the year-over-year change in the consumer price index. The difference between these two returns is then spread over a five year period, recognizing one-fifth of it in each of the current and four succeeding years. This approach effectively spreads the difference between (a) the total investment return (including both realized and unrealized capital changes) and (b) a hypothetical return based on a long-term real return rate, over a five year period.

(a) Funding Valuation Assets

The smoothed value of assets is then restricted to a range of 92% to 108% of market value, if necessary (range reduced from 90% to 110% of market value applied in the previous valuation). This means that in periods of significant market decline (growth) the smoothed value does not become too large (low) relative to the market value - effectively the constraint accelerates recognition of very poor (strong) market returns and allows the contribution rate to more appropriately reflect the actual returns earned by the plan. This revised lower constraint of 92% applied as at August 31, 2015.

The application of this approach to the total fund yields the following results:

Total Fund Smoothing

Target Return	2013	2014	2015
1. Aug-over-Aug increase in CPI	1.1%	2.1%	1.3%
2. Base return = (1) + 3.5%	4.6%	5.6%	4.8%
Year-end asset values - \$000's			
3. Market value	3,229,024	3,803,499	4,071,685
4. Smoothed value	3,027,588	3,423,149 ¹	3,745,950
5. Ratio of (4) ÷ (3)	0.938	0.900	0.920
Annual Returns			
6. Market value	10.5%	17.5%	7.4%
7. Smoothed value	5.6%	12.8%	9.8%

Using the relationship between the market and adjusted values shown in line 5 above, and applying this relationship to the Basic Account and Inflation Adjustment Account balances, we get:

Year-end asset values - \$000's

Basic Account	2013	2014	2015
8. Market value	2,881,592	3,391,315	3,639,305
9. Smoothed value	2,701,830	3,052,183 ¹	3,348,160
10. Ratio of (9) ÷ (8)	0.938	0.900	0.920
Inflation Adjustment Account			
11. Market value	347,432	412,184	432,380
12. Smoothed value	325,758	370,966 ¹	397,790
13. Ratio of (12) ÷ (11)	0.938	0.900	0.920

(b) Sustainable Indexing Valuation Assets

As mentioned previously, a primary reason for using a sustainable indexing approach is to improve intergenerational equity. Intergenerational equity would be best served by using best estimate assumptions (as we are doing) and not smoothing the assets. However, an important secondary objective is to attempt to stabilise the indexing target over time. This secondary objective is aided by smoothing the assets. In discussion with the Board, it was concluded that using a best estimate basis together with a low smoothing limit would provide a suitable balance between these two objectives. Accordingly, in our assessment we have used the five year smoothed value of assets, restricted to a range of 95% to 105% of the market value

¹ Capped at the lower bound of 90% as applied in the 2012 valuation.

of assets. This lower constraint applied as at August 31, 2015 where the smoothed assets for the sustainable indexing purposes were capped at 95% of market value.

Timing of Decrements

We updated our valuation system which has resulted in minor changes in assumptions as to the timing of decrements.

Mortality

Because of limited mortality experience, and given the similarity of the plans, we used the same basis as for the B.C. Teachers' Pension Plan valuation as at December 31, 2014, namely:

- (a) The incidence of mortality both prior to and after retirement (other than employees retired on account of disability) was assumed to be in accordance with 70% for males and 60% for females of the rates in the 2014 Public Sector Mortality Table (CPM2014Publ) for ages below 80, and 100% for males and 90% for females of the rates of CPM2014Publ for ages 80 and above, all projected using CPM Improvement Scale B (CPM-B).

The previous valuation used 55% for males and 70% for females of the respective rates in the 1994 Group Annuity Mortality Table.

- (b) For deferred vested pensions, mortality was ignored during the deferral period before retirement. This same assumption was made in the previous valuation.
- (c) For employees retired on account of disability we used 75% for males and 80% for females of the mortality rates (applicable in 2012) for similar retirees used for the valuation of the Pension Plan for the Public Service of Canada as at March 31, 2011. The previous valuation used 75% for males and 80% for females of the mortality rates (applicable in 1997) for similar retirees used for the valuation of the Pension Plan for the Public Service of Canada (previously referred to as the Canadian Public Service Superannuation Plan) as at March 31, 1996.

Withdrawal

We examined the rates of withdrawal for reasons other than death, retirement or disability over the period September 1, 2012 to August 31, 2015 and compared this with the experience observed and the rates used for previous valuations. The observed rates for all members were higher than assumed in previous valuations. As a result, we made changes to the withdrawal rates used for the previous valuation, by adopting the following multiples of those rates.

Multiples Applied to 2012 Rates

	In the first 3 years of service			After 3 years of service
	1 st year	2 nd year	3 rd year	
Males	115%	120%	120%	120%
Females	115%	115%	120%	120%

Sample withdrawal rates are shown in the following tables.

**A. Withdrawal Rates Applicable in the First 3 Years of Service
(These include terminations from disability)**

Age at entry	2015 valuation			2012 valuation		
	1 st year	2 nd year	3 rd year	1 st year	2 nd year	3 rd year
Males						
20	.200	.157	.113	.174	.131	.094
30	.200	.157	.113	.174	.131	.094
40	.200	.157	.113	.174	.131	.094
50	.200	.157	.113	.174	.131	.094
Females						
20	.085	.106	.092	.074	.092	.077
30	.220	.221	.143	.191	.192	.119
40	.194	.133	.106	.169	.116	.088
50	.194	.133	.106	.169	.116	.088

B. Withdrawal Rates Applicable After 3 Years of Service

Attained age	Males		Females	
	2015 valuation	2012 valuation	2015 valuation	2012 valuation
23	.088	.073	.127	.106
33	.052	.043	.088	.073
43	.036	.030	.037	.031
53	.036	.030	.034	.028

The withdrawal rates we have used do not extend past age 54; they were previously set at a level less than 100% of experience rates to be on a basis consistent with our handling of the inactive member data, where we assume some will be reactivated.

Disability

The Plan provides for either the payment of a disability pension from the Plan or, for members receiving long-term disability benefits, the continued accrual of pension benefits. Because of limited experience, and given the similarity of the plans, we have continued to use the same rates as for the B.C. Teachers' Pension Plan valuation as at December 31, 2014. Since most members receive continuing disability service credits rather than an immediate pension, we have continued to value the disability cost for active members as a deferred pension (indexed before retirement) with continued accrual of service, rather than as an immediate pension. Based on an examination of those now retired who had, prior to retirement, been in receipt of disability service credits, we assumed that the deferred pensions would commence at age 63 (or, immediately, for those older than age 63). The same assumption was made in the 2012 valuation.

Sample disability rates are shown in the following table. No direct allowance is made for the possibility of an individual recovering from disability prior to retirement - the rates used have been reduced from the observed disability incidence to implicitly allow for such recoveries.

Sample Disability Rates

Age	2015 valuation		2012 valuation	
	Males	Females	Males	Females
25	.0002	.0001	.0002	.0001
35	.0002	.0007	.0003	.0007
45	.0014	.0022	.0016	.0023
55	.0046	.0059	.0044	.0064

The rates used for this valuation are 120% for males and 100% for females of the respective rates used for the valuation of the Canadian Public Service Superannuation Plan as at March 31, 2011. The 2012 valuation used 100% for males and 100% for females of the respective rates used for the valuation of the Pension Plan for the Public Service of Canada (previously referred to as the Canadian Public Service Superannuation Plan) as at March 31, 2005.

Retirement

We examined the 2012-2015 retirement experience and compared this with the experience observed in our previous analyses of the retirement rates and with the rates used in the previous valuation. In general, the actual experience show fewer retirements than were indicated on the basis of the rates used in the previous valuation. We gave partial recognition to the observed experience by making modest adjustments to the rates previously used for retirement by slightly decreasing the rates for reduced early retirement for both males and females, and also slightly decreasing the rates assumed for unreduced retirement for males aged 60 and 62 to 64 inclusive, and for females aged 64.

The rates used in this and the previous valuation, are as follows:

Retirement Rates

Age	Service	2015 valuation		2012 valuation	
		Males	Females	Males	Females
For unreduced retirement pensions					
55-59	35	.25	.25	.25	.25
For members over age 59 (unreduced for pre 2016 service, reduced for post 2015 service if less than 35 years of total service)					
60	10	.28	.32	.33	.32
61	10	.18	.22	.18	.22
62	10	.18	.22	.20	.22
63	10	.18	.26	.22	.26
64	10	.20	.28	.24	.30
65	0	1.00	1.00	1.00	1.00
For reduced early retirement					
55-59	at least 10 years, but age plus service add to less than 80	.02	.04	.04	.05
55-59	age plus service add to at least 80	.10	.12	.11	.14

It should also be noted that even though pensions (unreduced and reduced) are available with less than 10 years of service, we have continued to apply the retirement rates before age 65 only to those with 10 or more years of service, on the presumption that those with fewer than 10 years would not retire until age 65.

Seniority Salary Scales

Seniority salary increases are in addition to the general salary increases and are intended to reflect increasing seniority, recognition of merit and promotion. We examined the seniority salary scales based both on the earnings history of the active members during the 3 year period ended August 31, 2015 and on the graduated average salaries of the active members as of August 31, 2015, and compared these with the experience observed and rates used in the previous valuation. Based on these investigations we decided to continue with the previous salary scales.

The annual seniority increases are assumed to reduce with age. Sample seniority increase assumptions at key ages are shown below. The assumptions represent the assumed seniority increase in the next year. Note that these rates are the same as those used for the previous valuation, but that valuation report showed the rates expressed as a proportion of earnings at age 65.

Sample Seniority Earnings Rates

Age	2015 and 2012 valuations	
	Males	Females
25	.036	.026
35	.022	.018
45	.007	.008
55	.002	.004
65	.000	.000

Proportion of Eligible Terminating Members Electing a Vested Pension

Following the introduction of the new PBSA effective September 30, 2015 which requires that a vested pension is payable for all service, we have valued all terminations as vested pensions. In the previous valuation, we valued all terminations with 2 or more years of service as vested pensions and assumed that those with less than 2 years of service would elect a refund of contributions with interest (as although they were immediately vested in the College Plan, the Plan provisions prior to the new PBSA provided for a refund of contributions with interest for members choosing a termination benefit rather than a deferred pension).

Proportions of Members Married at Death

We assumed that the surviving spouses of all vested members who die after age 55 would opt to take the commuted value of the pension earned to the date of death. As the benefit is the same regardless of marital status, the proportions of members assumed to be married at death are irrelevant for this valuation. The same assumption was made in the previous valuation.

Growth of Active College Population

We assumed in all the actuarial projections that there would be no future growth or decline in the College population. The same assumption was made in the previous valuation.

Expenses

Administration expenses are paid out of the College fund. These amounts totaled 0.49%, 0.51% and 0.52% of salaries during fiscal 2013, 2014 and 2015 respectively. The projected expenses provided by the Pension Corporation for the next few years estimate administration expenses will increase slightly. Therefore, we continued with the expense provision of 0.60% of payroll used in the previous valuation, as part of the normal actuarial costs in the determination of the required contribution rates under the entry-age funding method. This provision represents the average projected expenses, expressed as a percentage of projected payroll,

over the next valuation period. We also include a provision for the present value of expenses in the statement of actuarial position. The same methodology was used in the previous valuation.

As before, the investment management fees are excluded from our analysis above and from the expense provision we have made as they are reflected in the long-term investment return assumption.

Refunds

Since we have valued all active terminations as vested pensions, the interest assumed to be earned in the future on member contributions is irrelevant for this valuation. In the previous valuation, we assumed an interest assumption for accumulation and refunds of member contributions of 1.5% less than the valuation investment return assumption, i.e. at 5.0% per annum.

Recognition of Child-Rearing Periods for Pension Eligibility

We continued to assume that this would only affect female members (while males are eligible for this benefit, the take-up rate for males does not justify an assumption that males will utilize it), and that, on average, it would increase the member's contributory service (which is used for determining pension eligibility) by 2 years; there would, of course, be no increase to the member's pensionable service (which is used for determining pension amounts). The impact of this would be to reduce the eligibility requirement for unreduced pensions from 35 years to 33 years, and we assumed that there would be no impact on the eligibility assumptions made for other benefits. The same assumption was made in the previous valuation.

Plan Termination

The Standards of Practice issued by the Canadian Institute of Actuaries require that a valuation report "disclose the financial position of the plan if it were to be wound up on the calculation date, unless the plan does not define the benefits payable upon wind-up, in which case the actuary should include a statement to that effect."

The Joint Trust Agreement, which sets out the governing framework under joint trusteeship, does not address wind-up, and neither do the plan rules, therefore the benefits on wind-up are not defined. Accordingly, we no longer comment on the financial position of the plan if were to be wound up as we have done in previous valuations.

Funding Valuation: Fully Indexed Valuations - Assumption Changes

We made the following changes to the assumptions when doing the fully indexed valuations:

- We combined the assets in the Basic and Inflation Adjustment Accounts, resulting in a smoothed asset value of \$3,745,950,000;

- We applied an indexing assumption equal to the full assumed underlying inflation rate, i.e. 2.75% per annum. This indexing rate was applied both to pensions after retirement and during the pre-retirement period in the case of deferred vested pensions and disability salary accruals. For active members, our program applies the indexing on a continuous basis after retirement; for existing pensioners and deferred vesteds, the indexing is applied annually, in arrears; and
- We combined the contribution rates to Basic and IAA, i.e. we assumed a total member contribution rate of $8.39\% + 1.57^1\% = 9.96\%$, and a total employer rate of $8.49\% + 1.57^1\% = 10.06\%$, both level i.e. applying to salaries above and below the YMPE.

Funding Valuation - Maximum Pension Rule - Assumption Changes

As noted earlier, we have not applied the maximum pension rules when doing the primary Basic and Basic-plus-Indexed valuations. We have applied them, as described below, when doing the supplementary valuations with benefits limited to the *ITA* maximums.

The maximum annual pension currently permitted under the income tax rules is the lesser of:

- (i) \$2,818.89 in 2015 (\$2,890.00 in 2016) multiplied by the years of service; and
- (ii) 2% multiplied by the years of service further multiplied by the average of the best 3 years of remuneration paid to the member.

While the Plan applies the *ITA* limits only in respect of service after 1991, we have, for ease of calculation, assumed that this limit applies on all service; this assumption does not affect the future normal costs, but the accrued liabilities will be slightly understated.

For an individual in this Plan to be currently affected by the \$2,818.89 maximum the final average salary must be very high. While current salaries are not such as to cause many problems, the salaries projected in the future through application of the assumed salary increase rates outlined above are such that some individuals would be limited. However, under the income tax rules, the flat \$2,890.00 limit is automatically indexed each year after 2016 in accordance with increases in the average wage. Accordingly, we have applied a 3.5% per annum increase to the \$2,890.00 limit after 2016. (At the previous valuation the corresponding dollar limit was \$2,646.67 for 2012, \$2,696.67 for 2013, and was scheduled to be automatically indexed each year after 2013 in accordance with increases in the average wage; an increase rate of 3.75% was applied after 2013 to the \$2,696.67 limit at the previous valuation.)

As with the previous valuation, in the tax-limited results, we valued the deferred vested pensions not yet in pay, in full, as provided to us, i.e. we were unable to carve out any "excess" portions but given the changes to the pension administration system, we were able to carve out the supplemental pensions in pay.

¹ The IAA contribution increased from 1.38% to 1.47% effective January 1, 2016, and then increased to 1.57% effective April 1, 2016 for both members and employers.

Appendix C: Active Member Data as at August 31, 2015

Age group ¹	Active members August 31, 2015 ²			New entrants Sept. 1, 2010 to Aug. 31, 2015 and still active Aug. 31, 2015	
	Number	Average annual earnings ³ \$	Average service (years)	Number	Average annual earnings ³ \$
Males					
19-24	7	63,059	0.1	16	57,641
25-29	50	59,443	0.7	115	65,486
30-34	218	68,065	1.5	266	69,966
35-39	410	72,709	2.9	270	72,767
40-44	600	78,185	4.4	271	75,537
45-49	732	81,332	6.3	220	76,052
50-54	929	84,675	9.5	172	79,805
55-59	886	86,612	11.0	124	80,279
60 & over	1,069	87,697	12.3	103	80,641
Total males	4,901	82,362	8.3	1,557	74,438
Females					
19-24	11	36,296	0.5	39	54,422
25-29	113	60,167	0.9	219	62,449
30-34	362	66,446	1.9	347	67,180
35-39	634	72,166	3.2	370	70,982
40-44	843	76,446	4.6	334	72,732
45-49	995	78,852	6.5	278	70,083
50-54	1,066	81,122	8.4	251	76,484
55-59	1,038	83,193	10.8	145	73,601
60 & over	985	82,709	11.9	84	74,013
Total females	6,047	78,420	7.5	2,067	70,264
Total males & females	10,948	80,185	7.8	3,624	72,057

¹ Age nearest birthday at August 31, 2015 for actives and at entry for new entrants.

² 2,606 actives reclassified as inactive data.

³ Actual earnings in fiscal 2015 for those employed all year and annualized for others. Zero, very low or very high earnings figures were replaced by the average earnings in the same age-sex group or the closest age group if there is only one member.

A comparison of the August 31, 2015 active membership with the August 31, 2012 active membership is as follows:

Active membership	Aug. 31, 2012	Aug. 31, 2015	Change 2012 to 2015
Males			
- Number	4,785	4,901	+ 2.4%
- Proportion of total	44.8%	44.8%	unchanged
- Average age (at 8.31)	50.9	51.1	+ 0.2 years
- Average service	8.4	8.3	- 0.1 years
- Average salary	\$79,843	\$82,362	+ 3.2%
Females			
- Number	5,886	6,047	+ 2.7%
- Proportion of total	55.2%	55.2%	unchanged
- Average age (at 8.31)	49.0	49.2	+ 0.2 years
- Average service	7.4	7.5	+ 0.1 years
- Average salary	\$75,399	\$78,420	+ 4.0%

The above comparison indicates a continuing increase in both the male and female membership during the 3 year inter-valuation period, with a slightly larger increase in the number of females, although the proportion of males to females keep unchanged. The average age has increased for both males and females, notwithstanding the increase in the covered membership.

A comparison of the new entrant subset used at August 31, 2015 with that used at August 31, 2012 in determining the entry-age normal costs is as follows:

New entrants	Aug. 31, 2012	Aug. 31, 2015	Change 2012 to 2015
Males			
- Number	1,849	1,557	- 15.8%
- Proportion of total	42.8%	43.0%	+ 0.2%
- Average age at entry	44.9	42.9	- 2.0 years
- Average salary	\$71,808	\$74,438	+ 3.7%
Females			
- Number	2,470	2,067	- 16.3%
- Proportion of total	57.2%	57.0%	- 0.2%
- Average age at entry	42.7	41.6	- 1.1 years
- Average salary	\$67,521	\$70,264	+ 4.1%

As discussed in Appendix B, the new entrant statistics for this valuation are based on the new entrants to the plan who joined the plan in the last five years prior to the valuation date and were still active as of August 31, 2015. This is in contrast to the new entrant statistics for the August 31, 2012 valuation which were based on members with less than five years of contributory service at the valuation date (as a proxy for the entrants in the 5-year period preceding the valuation date). The main reason for the decrease in the number of new entrants shown in the table above is the change in the methodology. The average age of new entrants has decreased for both males and females, again largely due to the change in methodology. The increase in average salary for new entrants is slightly higher than the increase in average salary for the actives as a whole.

Appendix D: Inactive Member Data as at August 31, 2015

1. Inactive Members Assumed Reactivated on Valuation Date

Age group ¹	Males			Females		
	Number	Average annual earnings ²	Average service (years)	Number	Average annual earnings ²	Average service (years)
25-34	4	\$67,010	2.3	11	\$66,860	2.8
35-39	14	72,585	3.1	22	71,563	2.9
40-44	16	78,570	3.4	42	76,655	3.7
45-49	33	81,886	3.3	35	79,092	4.0
50-54	47	84,561	4.1	45	81,017	6.6
55-59	34	86,450	4.1	61	82,998	5.2
60 & over	30	88,195	4.8	51	82,386	3.7
Total	178	83,164	3.9	267	79,430	4.5

	Number	Average age	Average annual earnings ²	Average service
Total males & females	445	51.3	\$80,924	4.2 years

2. Members on Long-Term Disability

Age group ¹	Males			Females		
	Number	Average annual earnings	Average service (years)	Number	Average annual earnings	Average service (years)
30-39	-	-	-	5	\$75,337	5.0
40-44	-	-	-	9	79,760	6.8
45-49 ³	6	73,587	9.0	17	76,278	9.6
50-54	16	78,987	12.1	35	80,630	11.9
55-59	11	84,648	16.5	41	82,153	16.2
60 & over	36	85,936	21.3	70	81,828	19.1
Total	69	83,045	17.3	177	80,845	15.1

	Number	Average age	Average annual earnings	Average service
Total males & females	246	56.4	\$81,462	15.7 years

¹ Age nearest birthday at August 31, 2015.

² Assumed same earnings as per the average for active members of the in same age and sex.

³ 3 males ages 30-44 are included in the 45-49 row due to privacy.

3. Other Inactive Members Assumed Electing Vested Pensions

Age group ¹	Males			Females		
	Average annual vested pensions			Average annual vested pensions		
	Number	Initial ²	Offset at age 65	Number	Initial ²	Offset at age 65
20-29	21	\$344	\$42	21	\$312	\$41
30-34	57	372	45	116	816	101
35-39	142	1,033	116	211	1,225	145
40-44	230	1,786	187	356	1,765	199
45-49	325	2,446	252	477	2,526	268
50-54	443	3,728	362	579	3,136	335
55-59	445	3,404	338	534	3,103	333
60 & over	566	1,915	232	478	1,992	259
Total	2,229	2,526	263	2,772	2,387	266

	Number	Average age	Average annual vested pension - initial	Average annual vested pension - Offset at age 65
Total males & females	5,001	51.6	\$2,449	\$265

4. Remaining Inactive Members

Number	Member contributions with interest
2,353	\$4,175,741

Average age is 46.8.

¹ Age nearest birthday at August 31, 2015.

² These pensions are assumed to commence at the first age at which the member is entitled to an unreduced pension, assuming this is no earlier than age 60 i.e. at various ages between 60 and 65.

Appendix E: Pensioner Data as at August 31, 2015

1. Former Contributors

Age group ¹	Number of pensioners ²	Annual Pensions (\$000's) ³				
		Single life	Joint life & survivor	Joint life & survivor with guarantee	Single life with guarantee	Temporary life
Male pensioners						
Less than 60	100	-	-	1,583	482	408
60-64	439	385	429	6,159	3,316	1,872
65-69	893	2,419	3,268	11,028	4,298	292
70-74	873	3,730	7,435	6,665	3,799	-
75-79	456	3,562	4,996	756	668	-
80-84	240	2,223	1,960	-	40	-
85-89	126	952	606	-	8	-
90 & over	49	452	169	-	-	-
Total	3,176	13,723	18,863	26,191	12,611	2,572
Female pensioners						
Less than 60	177	-	-	1,103	1,688	595
60-64	634	868	456	5,272	6,173	2,261
65-69	998	5,191	2,059	6,441	9,214	309
70-74	620	6,346	2,536	1,704	2,819	-
75-79	261	3,315	763	145	408	-
80-84	122	1,369	163	-	1	-
85-89	64	636	11	-	-	-
90 & over	30	339	-	-	-	-
Total	2,906	18,064	5,988	14,665	20,303	3,165
Grand Total	6,082	31,787	24,851	40,856	32,914	5,737

Supplemental pensions included in the above amounts are as follows:

Supplemental Pensions included	127	118	237	124	-
---------------------------------------	------------	------------	------------	------------	----------

Average age of the 6,082 pensioners is 69.9.

¹ Age nearest birthday at August 31, 2015.

² These numbers include only those who were formerly contributors to the plan as well as pre-retirement limited members (i.e. divorced spouses with a pension interest). For the latter group, under the Family Relations Act, any temporary bridge benefit which is payable ceases at the date the original member reaches age 65 and, as a result, it is possible to have a bridge pension payable past the recipient reaching age 65.

³ Including supplements to January 1, 2015.

2. Beneficiaries

Age group ¹	Number of beneficiaries ²	Annual Pensions (\$000's) ³	
		Single life	Single life with guarantee
Male beneficiaries			
Less than 59	4	27	8
60-64	12	132	72
65-69	18	106	266
70-74	12	110	105
75-79	11	144	5
80-84	5	35	1
85 & over	7	27	47
Total	69	581	504
Female beneficiaries			
Less than 50	3	-	17
50-54	9	43	63
55-59	17	77	127
60-64	29	261	153
65-69	49	512	377
70-74	54	1,011	219
75-79	59	1,004	22
80-84	43	455	-
85-89	52	604	-
90 & over	37	487	-
Total	352	4,454	978
Remaining guarantees	27	-	592
Grand Total	448	5,035	2,074

Supplemental pensions included in the above amounts are as follows:

Supplemental Pensions included	24	25
---------------------------------------	-----------	-----------

Average age of the 352 beneficiaries is 74.7.

¹ Age nearest birthday at August 31, 2015.

² These numbers include spouses (or estates) currently receiving benefits where the former contributor is deceased.

³ Including supplements to January 1, 2015.

Appendix F: Development of Required Contribution Rates

All of the figures shown herein are on a combined member/employer basis. 2015 figures are as a level percentage of pay and 2012 figures are integrated.

	2015 ¹ Level (non-integrated)	2012 ² Integrated
Normal ("entry-age") actuarial cost portion	%	%
Males	16.30	16.70
Females	16.89	16.94
Combined	16.63	16.84

The change in the normal actuarial cost from 2012 to 2015 can be traced as follows:

	Combined (%)
Normal cost at 2012 valuation (Integrated rate)	16.84
▪ introduction of 2016 benefit changes	0.01
▪ remove integration in the contribution rate	(1.03)
Revised level normal cost at 2012 valuation allowing for 2016 benefit changes (level, non-integrated rate)	15.82
Data changes	(0.30)
Assumption changes:	
▪ economic assumption change	0.50
▪ pre-retirement mortality	0.00
▪ disability incident rates	(0.01)
▪ withdrawal rates	(0.10)
▪ retirement rates	0.03
▪ post-retirement mortality	0.66
▪ post-retirement mortality for disabled pensioners	0.03
Total change	0.81
Normal cost at 2015 valuation (level, non-integrated rate)	16.63

¹ As level percent of pay.

² Less 1.5% of salary up YMPE.

Calculation of Required Contribution Rate

	2015	2012 Allowing for 2016 benefit changes (level)	2012 Prior to 2016 benefit changes (integrated)
A. Normal (entry-age) actuarial cost	16.63%	15.82%	16.84%
B. Surplus (Unfunded) actuarial liability on entry-age basis (\$000s)	67,092	(99,720)	(108,972)
C. Present value of existing amortization requirements (\$000s)			
(i) 0.06% to 2021	2,632	3,576	3,576
(ii) 1.04% to 2027	84,594	0	0
D. Sum of B + C	154,318	(96,144)	(105,396)
E. Balance of unfunded liability to be amortized over 15 years (\$000s) (= D, or zero if B and D are greater than zero)	0	(96,144)	(105,396)
F. 15 year amortization of balance of unfunded actuarial liability	0%	1.04%	1.14%
G. 5% of net liability (PBSA minimum surplus)	164,053	n/a	n/a
H. Excess over PBSA minimum surplus (= B – G, if greater than zero)	0	n/a	n/a
	%	%	%
I. PBSA 5 year amortization of excess over PBSA minimum	0.00	n/a	n/a
J. Funding policy amortization of excess over PBSA minimum surplus			
(i) 25 year amortization	0.00		
(ii) 15 year amortization	0.00		
K. Total PBSA amortization requirement			
(i) to 2021	0.00	0.06	0.06
(ii) to 2027	0.00	1.04	1.14
Total	0.00	1.10	1.20
L. Total minimum required contribution rate	16.63	16.92	18.04

Following the introduction of the 2016 benefit changes, the percentages are applied to members' total earnings, both below and above the YMPE. The last column shows the results from the 2012 valuation before the 2016 benefit changes and these percentages are applied to members' total earnings and are reduced for the amount below the YMPE by 0.75% of each member's salary up to the YMPE for each of the members and the employers, for a 1.5% total reduction.

Appendix G: Comparative Results

Comparative Funding Valuation Results on Fully Indexed Basis, and with Income Tax Limits

The results herein are analogous to those contained in Schedules 1, 3 and 5 in the body of the report. For ease of comparison, we have repeated the 2015 Basic Account results; selected 2012 comparisons are also shown. The results are included for:

- Basic (i.e. non-indexed) benefits only, no tax limits;
- Basic plus Indexed, no tax limits;
- Basic only, with tax limits; and
- Basic plus Indexed, with tax limits

Schedule G1 – Statement of Actuarial Position as at August 31, 2015

Present Plan – (\$000's)

	Without Tax Limits		With Tax Limits	
	Basic Only	Basic + Indexed	Basic Only	Basic + Indexed
Assets				
Market value of Fund	3,639,305	4,071,685	3,639,305	4,071,685
Asset smoothing adjustment	(291,145)	(325,735)	(291,145)	(325,735)
Smoothed value of fund	3,348,160	3,745,950	3,348,160	3,745,950
Actuarial present values of future contributions at entry-age rates	1,013,178	1,396,394	1,004,648	1,385,428
Total Assets without amortization	4,361,338	5,142,344	4,352,808	5,131,378
Liabilities				
Actuarial present values for:				
▪ pensions being paid	1,618,167	2,096,546	1,610,431	2,086,526
▪ inactive members	200,574	306,301	200,574	306,301
▪ active members	2,438,950	3,305,577	2,429,382	3,293,298
▪ future expenses	36,555	36,555	36,555	36,555
Total Liabilities	4,294,246	5,744,979	4,276,942	5,722,680
Surplus (Unfunded Liability) – without existing amortization	67,092	(602,635)	75,866	(591,302)
Present value of existing amortization (0.06% to 2021)	2,632	2,632	2,632	2,632
Present value of existing amortization (1.04% to 2027)	84,594	84,594	84,594	84,594
Surplus (Unfunded Liability) – with existing amortization	154,318	(515,409)	163,092	(504,076)
Selected 2012 Comparisons (before benefit changes)				
Total Assets without amortization	3,509,952	4,200,925	3,506,327	4,196,695
Total Liabilities	3,618,924	4,999,623	3,606,889	4,983,168
Surplus (Unfunded Actuarial Liability)	(108,972)	(798,698)	(100,562)	(786,473)
Present value of existing amortization (0.06% to 2021)	3,576	3,576	3,576	3,576
Present value of existing amortization (1.14% to 2027)	105,396	105,396	105,396	105,396
Surplus (Unfunded Liability) with amortization	0	(689,726)	8,410	(677,501)

Schedule G3 – Current and Required Contribution Rates – August 31, 2015

	Without Tax Limits		With Tax Limits	
	Basic Only (%)	Basic + Indexed (%)	Basic Only (%)	Basic + Indexed (%)
Current contribution rates				
Member ^{1,2}	8.39	9.96	8.39	9.96
Employer ^{1,2}	8.49	10.06	8.49	10.06
Combined member/employer	16.88	20.02	16.88	20.02
Required contribution rates				
Entry age normal cost rate²	16.63	22.92	16.49	22.74
Amortization of unfunded actuarial liability (surplus ³)				
▪ 25 year amortization	0.00	4.16	0.00	4.08
▪ 15 year amortization	0.00	6.15	0.00	6.03
▪ PBSA amortization	0.00	n/a	0.00	n/a
Total contribution rate				
▪ 25 year amortization	16.63	27.08	16.49	26.82
▪ 15 year amortization	16.63	29.07	16.49	28.77
▪ PBSA rate	16.63	n/a	16.49	n/a
Total required contribution rate	16.63	n/a	16.49	n/a
Selected 2012 Comparisons (before benefit changes)				
Member ⁴	8.31	9.69	8.31	9.69
Employer ⁴	8.41	9.79	8.41	9.79
Combined member/employer	16.72	19.48	16.72	19.48
Required contribution rates				
Entry age normal cost rate⁴	16.84	23.01	16.78	22.94
Amortization of unfunded actuarial liability (surplus)				
▪ 25 year amortization	0.80	5.86	0.74	5.77
▪ 15 year amortization	1.18	8.66	1.09	8.53
▪ PBSA amortization	1.20	n/a	1.11	n/a
Total contribution rate				
▪ 25 year amortization	17.64	28.87	17.52	28.71
▪ 15 year amortization	18.02	31.67	17.87	31.47
▪ PBSA rate	18.04	n/a	17.89	n/a
Total required contribution rate	18.04	n/a	17.89	n/a

¹ Non-indexed costs ignore IAA contribution; indexed costs include IAA contributions of 1.57% for both employee and employer (rate effective April 1st, 2016).

² As a level percentage of pay.

³ The 25 year, 15 year and PBSA amortization requirements are applied to the surplus in excess of 5% of the net liability.

⁴ Less 0.75% of salary up YMPE (for each of the members and the employers).

Schedule G4 – Accrued Liabilities and Funded Ratio – August 31, 2015

(\$000's)	Without Tax Limits		With Tax Limits	
	Basic Only	Basic + Indexed	Basic Only	Basic + Indexed
Assets – smoothed value	3,348,160	3,745,950	3,348,160	3,745,950
Accrued Liabilities				
▪ for pensions being paid	1,618,167	2,096,546	1,610,431	2,086,526
▪ for inactive members	200,574	306,301	200,574	306,301
▪ for active members	1,367,390	1,844,439	1,364,569	1,840,759
Total Accrued Liabilities	3,186,131	4,247,286	3,175,574	4,233,586
Surplus (Unfunded Actuarial Liability)	162,029	(501,336)	172,586	(487,636)
Funded Ratio – Fund ÷ Total Accrued Liabilities	105.1%	88.2%	105.4%	88.5%
Selected 2012 Comparisons (before benefit changes)				
Assets	2,549,390	2,867,567	2,549,390	2,867,567
Total Liabilities	2,571,230	3,553,779	2,561,405	3,540,374
Surplus (Unfunded Actuarial Liability)	(21,840)	(686,212)	(12,015)	(672,807)
Funded Ratio	99.2%	80.7%	99.5%	81.0%