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Actuarial Report on

British Columbia Municipal Pension Plan

Actuarial Valuation
as at December 31, 2015

Vancouver, B. C.

September 22, 2016

Eckler

Contents

Actuarial Report Highlights

BC Municipal Pension Plan

December 31, 2015

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

Scope of the Valuation

Two primary valuations were carried out:

- **A Funding Valuation** - to determine the financial position of the Basic Account as at December 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.

These valuations ignore 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 Changes Included in the Valuation

- Effective July 1, 2014, the member contribution rates to the Basic Account increased by 0.7% of salary for all Groups.
- Effective July 1, 2014, the employer contribution rates to the Basic Account increased by 0.76% of salary for Group 1, by 0.7% of salary for Group 3 and Group 4, by 0.50% for Group 2 and by 1.05% of salary for Group 5.

- Effective September 30, 2015, the plan rules were amended to ensure compliance with the enactment of the new *BC Pension Benefits Standards Act ("PBSA")* and Regulation.

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

Actuarial Methods and Assumptions

The actuarial liabilities include the value of benefits accrued by members as at December 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 the existing amortization rates.

The contribution rates are tested on the entry-age funding 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 Board's Funding Policy. This method is designed to maintain costs at a level percentage of salaries over an extended period. The resulting contribution rate is then tested against the going-concern requirements of the *PBSA* as required by the Joint Trust Agreement ("JTA").

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

Actuarial Position

The valuation indicates an improvement in the actuarial position for the Basic Account on the entry-age normal contribution basis. A surplus of $2,224 million has emerged since the December 31, 2012 valuation. In line with the JTA requirements, $297 million of this surplus is required to maintain the contribution rate at the current average rate of 19.57% of salaries, while the balance of $1,927 million is to be transferred to a contribution Rate Stabilization Account (RSA) within the Basic Account:

Basic Benefits Only, Without *ITA* Maximum: ($000's)	**2015**	**2012**
Assets	50,665,003	39,418,046[1]
Liabilities	48,440,929	39,418,046
Surplus (Unfunded Liability)	**2,224,074**	**0[1]**
Required surplus to keep the contribution rate at the current rate of 19.57% of salaries	296,773	
Balance of Surplus transferred to RSA	**1,927,301**	

The supplementary fully indexed valuation results are:

Basic and Indexed Benefits, Without *ITA* Maximum: ($000's)	**2015**	**2012**
Assets	61,008,660	48,051,892[2]
Assets transferred to RSA	(1,927,301)	
Assets after RSA transfer	**59,081,359**	
Liabilities	64,638,649	54,077,899
Surplus (Unfunded Liability)	**(5,557,290)**	**(6,026,007)[2]**

When the *ITA* maximums are recognized, the above surplus (unfunded liability) figures change modestly, to:

Benefits Limited to *ITA* Maximums ($000's)	**2015**	**2012**
Basic benefits only	523,007	182,657[2]
Basic and indexed benefits	(5,256,983)	(5,776,999)[2]

[1] The 2012 report showed a $1,370,323 thousand unfunded liability on the entry age basis, after taking into account the present value of then currently existing amortization requirements of $2,119,303 thousand. When amortized over 15 years (to 2027) this resulted in an amortization requirement of 1.25% of pay. Showing the amortization requirement as an asset, as it is now part of the required contribution rate, reduces the unfunded liability to zero.

[2] Including $1,370,323,000 amortization requirement established at the 2012 valuation.

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 previously 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 contribute 9.00% (Group 1, 2 and 4 members) and 10.52% (Group 5 members) of salaries, less 1.5% of salaries up to the YMPE, for basic non-indexed benefits; employers contribute at different rates for each group, less amounts allocated to Medical Services Plan premiums.

The employer contributions are currently on a combination of a "doubling" basis and a level basis – for the doubling portion, the pre-2003 valuation contribution rates apply when a member is below age 50 (for Groups 1 and 4 members) or age 45 (Group 2 and 5 members); at ages above these, double the rates apply. Contribution rate increases since the 2003 valuation are on a level basis and do not “double”.

We have calculated all of the theoretical long-term costs assuming the "doubling" feature is eliminated.

The Joint Trust Agreement requires that the contribution rates comply with the going-concern requirements of the provincial pension standards legislation (the *PBSA*).

Basic Contribution Rate Requirements

	2015 (%)		
Current contribution rates[1, 2]	**Member**	**Employer**	**Total**
Group 1	9.00	9.87	18.87
Group 4	9.00	10.29	19.29
Group 2	9.00	13.96	22.96
Group 5	10.52	15.36	25.88
Average	**9.08**	**10.49**	**19.57**
Average Required Rates			
Entry-age normal cost rates			16.55
Total *PBSA* amortization			3.01
Additional Group 5 amortization (to 2024)[3]			0.23[4]
***PBSA* minimum rate - Average**			**19.57**
Required Rate Increase			0.00

In line with the JTA, as an actuarial excess has arisen at this valuation, a transfer of part of the surplus is required to a contribution rate stabilization account within the Basic Account, such that after the transfer the minimum required contribution rate is unchanged from the current average contribution rate of 19.57%[2] (integrated) of salaries.

[1] Less 1.5% of salary up to the YMPE (for each of the members and the employers).

[2] The current rates are shown on an equivalent "non-doubling" basis, based on current payrolls.

[3] This amount was established at the 2009 valuation to allow for the fact that members transferring from Group 2 are older than the assumed entry age to Group 5 and therefore the value of their future contributions at the entry age rate is less than the value of the corresponding future liability. This amount amortizes the shortfall over 15 years.

[4] The Group 5 amortization of 0.23% of Group 5 payroll is 0.01% of the Plan's total payroll, hence the PBSA minimum rate of 19.57% = 16.55%+3.01%+0.01%.

Combined Basic plus IAA Contribution Rates

In summary, the current and required contribution rates following this valuation are:

	Currrent and Required (%)				
	Basic[1]		IAA	Total[1]	
Members					
Groups 1, 2, 4	9.00		1.00	10.00	
Group 5	10.52		1.42	11.94	
Employers	**Doubling age**			**Doubling age**	
	Below	**Above**		**Below**	**Above**
Group 1	7.58	12.48	0.20	7.78	12.68
Group 4	8.02	13.42	0.20	8.22	13.62
Group 2	9.28	17.78	0.20	9.48	17.98
Group 5	11.35	19.85	0.62	11.97	20.47

These contribution rates comply with the going-concern requirements of the provincial pension standards legislation (i.e. the *PBSA*).

The required contribution rates for the employers shown above are more than the theoretical requirements for Groups 1, 2 and 5 members and less than the requirements for Group 4 members. The Board may wish to rebalance the employer rates by group so that each group is paying their theoretical requirement. To rebalance the rates, Group 1 , 2 and 5 employer Basic rates should increase by 0.02%, 0.20% and 0.44% respectively, while employer Basic rates for Group 4 should decrease by 0.06%.

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. Following this valuation, a waiver will be required for all groups.

Sustainable Indexing Valuation

The Sustainable Indexing Valuation shows that, taking the required Basic account contributions into account, indexing of 2.10% per year is sustainable in the long term. This is an increase from the sustainable indexing level of 1.95% 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.

[1] Integrated.

The Municipal Pension Board of Trustees
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I. Scope of the Valuation

In accordance with Article 10 of the Joint Trust Agreement (the "JTA") and on the instructions of the Municipal Pension Board of Trustees (the "Board of Trustees"), we have completed an actuarial valuation of the Basic Account and the Inflation Adustment Account of the Municipal Pension Plan (the "Plan") as at December 31, 2015 and are pleased to submit this report thereon.

Two primary valuations were carried out:

- **A Funding Valuation -** to determine the financial position of the Basic Account as at December 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 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.

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 December 31, 2012 and included in our report dated September 23, 2013, determined the actuarial position of the Plan as amended to December 31, 2012. Since then, a number of changes have been made to the Plan. The major changes affecting its financing include:

- Effective July 1, 2014, the member contribution rates to the Basic Account increased by 0.7% of salary for all Groups.
- Effective July 1, 2014, the employer contribution rates to the Basic Account increased by 0.76% of salary for Group 1, by 0.70% of salary for Group 3 and group 4, by 0.50% for Group 2 and by 1.05% of salary for Group 5[1].
- Effective September 30, 2015, the plan rules were amended to ensure compliance with the enactment of the new *PBSA* and Regulation.

There were no 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.

[1] These adjustments were the net result of the overall 0.7% increase required by the 2012 valuation and an adjustment to ensure that each group's contribution rate was in line with its theoretical costs. The adjustment for Group 1 was an increase of 0.06% of salary (i.e. total increase of 0.76% = 0.70% + 0.06%), while the Group 2 adjustment was a reduction in the rate of 0.2% of salary (i.e. net increase of 0.50% = 0.70%-0.20%) and the Group 5 adjustment was an increase of 0.35% of salary (i.e. total increase of 1.05%=0.70%+0.35%). There was no adjustment for Groups 3 and 4.

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 Municipal Pension Plan include:

(i) **Benefit security** - the probability of fulfilling the current benefit promises provided in the Plan depends on a mixture of political, economic and financial factors; but, whatever the probability, it is clear that benefit security is 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 on September 30, 2015) in which it established that its overall goal for basic benefits is the long term sustainability of the fund. The funding policy further identifies benefit security as the primary objective and stability of contributions 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 liabilities 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 liability in that the values 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) Retirement Annuity Account

In considering the fund assets for valuation purposes, we excluded the Retirement Annuity Account. This account holds member voluntary contributions as well as other balances in respect of special agreements with various employers that are accumulated on a money-purchase basis and may be converted at a member's retirement into additional amounts of pension. We excluded these assets from our valuation together with corresponding actuarial liabilities, on the assumption that any pension purchases for retiring employees from time to time will have a neutral effect on the Basic Account.

(d) Basic Account Valuation - Current Financing

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

(e) 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.

(f) 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 percentage rate 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 not generate either unfunded liabilities or 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, plus the value of the amortization amounts established at previous valuations. 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. Minimum contributions, expressed as a percentage of salaries, revert to the normal cost rate after the unfunded liability or surplus has been amortized.

(g) PBSA Requirements

The *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 from when they are established (with a one year time lag for any amortization requirements established on or after September 30,2015, which is the date the new *PBSA* came into effect), and special rules regarding the treatment of surplus. While the Municipal 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 funding requirements of the *PBSA*.

(h) 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 (f) above). In addition, unfunded liabilities must be amortized over not more than 15 years from when they are established, with a one year time lag for any amortization requirements established on or after September 30, 2015).

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.

Section 11.5(b) of the JTA requires the Board to use a 25 year period for the amortization of a surplus when considering its application towards benefit improvements without the prior approval of the Plan's partners, in order to provide a measure of contribution rate stability. Appendix B of the JTA also specifies a 25 year

surplus amortization period when implementing the contribution and benefit changes contemplated during the transitional period.

The plan is still within the JTA transitional period. The JTA transition requirements set out the parameters for dealing with gains and losses and associated contribution requirements as follows:

- Calculate the "normal cost rate" (i.e. the "entry-age rate").
- Calculate the surplus (or unfunded liability) using this rate, after taking into account the value of additional contributions required to amortize unfunded liabilities identified at previous valuations.
- If there is an unfunded liability, amortize the balance over 15 years, commencing one year 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, after removing all previously established amortization amounts there is a surplus, amortize it over a 25 year period, after first allowing for the cost of the transitional period benefit improvements. If the resulting amortization requirements allow the employer and member contribution rates to be rebalanced, then the benefits will be improved and contribution rates rebalanced.
- The foregoing rates are, of course, subject to being compatible with the *PBSA* going concern minimum funding requirements.
- The JTA rules require any contribution rate increases to be shared equally by the Plan members and the employers. The JTA transitional arrangements require that contribution rate decreases be applied so as to equalize member and employer contribution rates at the member rates in effect prior to the 2003 valuation (the employers will continue to pay the excess costs for Groups 2 and 5 members). Simultaneously, benefits must be improved in specified ways (see Appendix A). The transitional period is over once these conditions are met and there is sufficient surplus to allow the transfer of $500 million to the IAA and to set up a $500 million rate stabilization reserve in the Basic Account. The intent is that once transition requirements are met, future costs will be shared equally between members and employers. Thus, we express the future cost requirements as a combined member-plus-employer amount.
- The JTA rules were amended effective October 10, 2014 to provide that, notwithstanding anything to the contrary:
    - Effective January 1, 2019, the Basic Account contributions shall be reduced by 1.06% of salary and the Inflation Adjustment Account contributions will be increased by 1.06% of salary. The

decrease in the Basic Account contribution rate and the increase in the Inflation Adjustment Account contribution rate shall be shared equally by the active members and the employers.

- If Schedule 1 Statement of Actuarial Position of the December 31, 2015 actuarial valuation of the Plan identifies that there are surplus assets, those surplus assets shall be dealt with as follows:
  - a contribution rate stabilization account shall be established within the Basic Account in an amount up to but not exceeding $2.5 billion; and
  - any surplus assets in excess of $2.5 billion shall be allocated to the Inflation Adjustment Account up to but not exceeding an amount which will fund full indexing based on the long term inflation rate assumed in the 2015 sustainable indexing valuation.

(i) Eliminate "Doubling" Feature

The employer contribution rates are currently on a partly "doubling" basis. Under this method, the prescribed rate in effect prior to the contribution rate increase following the 2003 valuation applies when a member is below age 50 (for Groups 1 and 4 members) or age 45 (Groups 2 and 5 members); at ages above these, double the stated rates apply. Any increases in the employer rate following the 2003 valuation and subsequent valuations are on a level basis, i.e. the increase is the same regardless of member age. As described above, the JTA provides for rebalancing of member and employer contribution rates during a transition period, subject to the availability of surplus sufficient to provide for both the rebalancing of contribution rates and specified benefit improvements, at which time the employer "doubling" feature will be eliminated. Thus, we have calculated all of the theoretical long-term costs assuming the doubling feature is removed. To facilitate a comparison with the current employer rates, we also show the current rates on an equivalent level, i.e. non-doubling, basis, based on the salary distribution at the valuation date.

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.

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 December 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

We have allowed for the medical premium assistance carved out on a pay-as-you-go basis from employer contributions to the Basic Account (and paid through the Supplemental Benefits Account) by treating these as an on-going addition to the administration expenses. This implicitly assumes that the pay-as-you-go costs for this benefit will not change.

With respect to the indexed valuation results, we have reduced the employer contributions to the IAA to 0.2% (for Groups 1, 2 and 4) and 0.62% (for Group 5) of salaries on the assumption that 0.8% of salaries, the maximum set by the Board, will be allocated to post-retirement group benefits. We have not otherwise considered the liabilities and the financing of these benefits.

IV. Results of Funding Valuation

1. Basic Account - Actuarial Position

Schedule 1 shows a statement of the actuarial position of the Plan as at December 31, 2015 prior to applying the provisions of the JTA. This statement ignores liabilities for future indexing granted after the valuation, and assumes that member and employer contribution rates for basic pensions will be made at the entry-age normal cost rate i.e. 16.55% of salary, plus the previously established amortization amounts totaling 4.06% (and an additional 0.23% for Group 5 only) of salary currently scheduled to expire in 2018, 2024 and 2027.

Schedule 1 - Statement of Actuarial Position as at December 31, 2015 – Prior to JTA Requirements

Basic Account - Non-Indexed Benefits – Entry-age Normal Cost

	($000's)	
Assets	**2015**	**2012**
Market Value of Basic Fund	37,313,995	26,145,681
Asset Smoothing Adjustment	(2,985,120)	(1,327,270)
Smoothed Value of Fund	**34,328,875**	**24,818,411**
Actuarial present values of:		
▪ Future contributions at entry-age rates	13,390,928	11,110,009
▪ Present value of existing amortization		
• 1.06% to 2018 (from 2003 valuation – amended in 2006)	299,600	519,972
• 1.75% to 2024 (from 2009 valuation)	1,374,448	1,592,191
• 1.25% to 2027 (from 2012 valuation)	1,260,777	1,370,323[1]
• Group 5 additional amortization – 0.23% to 2024	10,375	7,140
Total Assets	**50,665,003**	**39,418,046**
Liabilities		
Actuarial present values for:		
▪ Pensions being paid	14,809,764	11,411,717
▪ Inactive members	2,306,249	1,777,817
▪ Active members	30,529,411	25,635,315
▪ Future expenses	795,505	593,197
Total Liabilities	**48,440,929**	**39,418,046**
Surplus (Unfunded Actuarial Liability)	**2,224,074**	**0[1]**
Funded Ratio: Total Assets ÷ Total Liabilities	**104.6%**	**100.0%[2]**

[1] The 2012 report showed a $1,370,323 thousand unfunded liability, on the entry age basis, after taking into account the present value of then currently existing amortization requirements of $2,119,303 thousand. When amortized over 15 years (to 2027) this resulted in an amortization requirement of 1.25%. Showing the amortization requirement as an asset, as it is now part of the required contribution rate, reduces the unfunded liability to zero.

[2] Prior to allowance for the 2012 amortization requirement of 1.25%, the 2012 funded ratio was 96.5%.

2. Change in Actuarial Position

The statement of actuarial position included in Schedule 1 indicates that a surplus of $2,224 million has emerged since December 31, 2012. The $2,224 million new unfunded liability is the net result of a number of items, the most significant 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 on surplus ($ millions)
1.	Surplus as at December 31, 2012	0
2.	Actual income from investments higher than 6.5% assumed rate (on smoothed values)	3,482
3.	Actual contributions lower than previously assumed[1]	(293)
4.	Actual salary increases to December 31, 2015 lower than previously assumed	555
5.	Changes in valuation demographic assumptions	(849)
6.	Changes in valuation economic assumptions	(878)
7.	Retirement experience gain	129
8.	Other factors (a net loss) including changes in plan membership and other differences between actuarial assumptions and actual experience during the intervaluation period	78
9.	Surplus (Unfunded Liability) at December 31, 2015	2,224

The $849 million loss due to changes in demographic assumptions (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 changes	Approximate effect ($ millions)
▪ Pre-retirement mortality	2
▪ Disability incidence rate	(1)
▪ Disability recovery rate	(12)
▪ Withdrawal rates	1
▪ Retirement rates	101
▪ Post-retirement mortality	(809)
▪ Post-retirement mortality for disabled pensioners	(131)
Total loss due to assumption changes	**(849)**

[1] 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 occurs 18 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 average current service contribution, including contributions by the members, required to finance the basic pensions of new entrants (i.e. the normal actuarial cost) has increased from 15.37% of salaries as at December 31, 2012 to 16.55% of salaries as at December 31, 2015. The 1.18% increase in the average 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 economic assumption (cost increase of 0.41%);
- the change in the mortality assumption (net increase of 0.66%); and
- the change in the expense assumption (cost increase of 0.15%); offset by
- the change in the retirement assumption (cost decrease of 0.07%).

(b) PBSA Minimum Rate

The valuation shows a surplus of $2,224,074,000 when including the present value of the existing amortization requirements established at previous valuations of $2,945,200,000. In line with the current JTA, this actuarial excess is to be used to:

(a) establish a contribution rate stabilization account (RSA) within the Basic Account in an amount up to but not exceeding $2.5 billion and

(b) to transfer any surplus assets in excess of $2.5 billion to the Inflation Adjustment Account up to but not exceeding an amount which will fund full indexing based on the long term inflation rate assumed in the 2015 sustainable indexing valuation.

Since the surplus is less than $2.5 billion, only step (a) above needs to be considered. The actual amount that can be transferred to the RSA is the amount by which the Basic Account asset balance (taken into account when calculating the required Basic contribution rates) needs to be reduced in order that the required Basic contribution rate remains unchanged at 19.57% of salaries.

The sum of the revised entry age normal cost of 16.55% of salaries plus the previously scheduled average amortization requirements of 4.07% of salaries (20.62%) exceeds the current contribution rate of 19.57% of salaries. To maintain a rate of 19.57% of salaries, the oldest established amortization requirement of 1.06%

needs to reduce to 0.01%, as shown in the revised Schedule 1 table below. A surplus of $296,773,000 is needed to achieve this (the difference between the present value of amortization payments of 1.06% of salaries to 2018 and 0.01% of salaries to 2018). The remaining $1,927,301,000 of the gain ($2,224,074,000 - $296,773,000) must be transferred to the RSA. The revised Scehdule1 is shown below:

Schedule 1 revised - Statement of Actuarial Position as at December 31, 2015 – after RSA transfer

Basic Account - Non-Indexed Benefits – Entry-age Normal Cost

	($000's)		
Assets	**2015 - after RSA transfer (1)**	**2015 – before RSA transfer (2)**	**Difference (1) - (2)**
Iniital Smoothed Value of Fund	34,328,875	34,328,875	-
Transfer to RSA	(1,927,301)	-	(1,927,301)
Adjusted Smoothed Value of Fund after RSA	**32,401,574**	**34,328,875**	**(1,927,301)**
Actuarial present values of:			
▪ Future contributions at entry-age rates	13,390,928	13,390,928	-
▪ Present value of existing amortization			
• 0.01%/1.06%[1] to 2018 (from 2003 valuation)	2,827	299,600	(296,773)
• 1.75% to 2024 (from 2009 valuation)	1,374,448	1,374,448	-
• 1.25% to 2027 (from 2012 valuation)	1,260,777	1,260,777	-
• Group 5 additional amortization – 0.23% to 2024[2]	10,375	10,375	-
Total Assets	**48,440,929**	**50,665,003**	**(2,224,074)**
Total Liabilities	**48,440,929**	**48,440,929**	**-**
Surplus (Unfunded Actuarial Liability)	**-**	**2,224,074**	**(2,224,074)**
Funded Ratio: Total Assets ÷ Total Liabilities	**100%**	**104.6%**	

The minimum average *PBSA* required contribution rate after the RSA transfer is equal to the normal cost of 16.55% plus the revised amortization requirement of 3.01% (Groups 1, 2 and 4) and 3.24% (Group 5) for a total average minimum *PBSA* contribution rate of 19.57% of salaries (integrated).

The current contribution rates, the contribution rates for current service (on an entry-age basis, i.e. the normal actuarial cost) and the amortization requirements are summarized in Schedule 3.

[1] 0.01% amortization after RSA transfer, 1.06% amortization before allowance for RSA transfer.

[2] 0.23% of Group 5 payroll is equivalent to 0.01% of total payroll.

Schedule 3 - Current and Required Basic Contribution Rates

		Based on without tax limit valuation results as at December 31					
		2015 (%)			2012 (%)		
	Current contribution rates[1, 2]	**Member**	**Employer**	**Total**	**Member**	**Employer**	**Total**
1	Group 1	9.00	9.87	18.87	8.30	9.10	17.40
2	Group 4	9.00	10.29	19.29	8.30	9.61	17.91
3	Group 2	9.00	13.96	22.96	8.30	12.75	21.05
4	Group 5	10.52	15.36	25.88	9.82	13.74	23.56
5	**Average**	**9.08**	**10.49**	**19.57**	**8.35**	**9.70**	**18.05**
	Entry-age normal cost rates[1]						
6	Group 1[3]			15.91			14.79
7	Group 4[3]			16.28			15.24
8	Group 2			19.48			18.18
9	Group 5			22.55			21.01
10	**Entry-age normal cost - Average**			**16.55**			**15.37**
	Amortization of unfunded actuarial liability (surplus)						
	PBSA amortization						
11	• to 2018			0.01			1.06
12	• to 2024			1.75			1.75
13	• to 2027			1.25			1.25
14	**Total *PBSA* amortization (=11+12+13)**			**3.01**			**4.06**
15	Additional Group 5 amortization (to 2024)[3, 4]			0.23[5]			0.23
	***PBSA* minimum rate basis[1, 4, 6]**						
16	Group 1 (= 6+14)			18.92			18.85
17	Group 4 (= 7+14)			19.29			19.30
18	Group 2 (= 8+14)			22.49			22.24
19	Group 5 (= 9+14+15)			25.79			25.30
20	***PBSA* minimum rate - Average**			**19.57**			**19.44**
21	**Required Contribution Rate Increase – Average**			**0.00**			**1.39**

1 Less 1.5% of salary up to the YMPE (for each of the members and the employers).

2 The current rates are shown on an equivalent "non-doubling" basis, based on current payrolls.

3 The average group 1&4 entry age normal cost is 16.16% (15.09% at 2012).

4 This amount was established at the 2009 valuation to allow for the fact that members transferring from Group 2 are older than the assumed entry age to Group 5 and therefore the value of their future contributions at the entry age rate is less than the value of the corresponding future liability. This amount amortizes the shortfall over 15 years.

5 The Group 5 amortization of 0.23% of Group 5 payroll is 0.01% of the Plan's total payroll, hence the PBSA minimum rate of 19.57% = 16.55%+3.01%+0.01%

6 The total contribution rate to the plan needs to comply with the *PBSA* requirements. The *PBSA* does not apply at the group level.

In line with the JTA, as an actuarial excess arose as of this valuation there is no change to the current contribution rate of 19.57% of salaries.

4. Revised Contribution Rates

As discussed above, no change to the overall basic contribution rate is required. The IAA contribution rates are not revised as a result of the valuation and therefore may continue unchanged at their current level.

The following table summarizes the current contribution rates.

Schedule 4 - Current and Required Total Contribution Rates

	Current and required (%)				
	Basic[1]		IAA	Total[1]	
Members					
Groups 1, 2, 4	9.00		1.00	10.00	
Group 5	10.52		1.42	11.94	
Employers	**Doubling age**			**Doubling age**	
	Below	**Above**		**Below**	**Above**
Group 1	7.58	12.48	0.20	7.78	12.68
Group 4	8.02	13.42	0.20	8.22	13.62
Group 2	9.28	17.78	0.20	9.48	17.98
Group 5	11.35	19.85	0.62	11.97	20.47

Contribution Rate Imbalance

Schedule 4 confirms that no adjustments are needed to current rates in order for the Plan's average rate to meet the requirements of the PBSA. It is, however, necessary to consider whether each Group is paying their correct share of the overall required rate. To the extent that they are not, an imbalance arises, which in terms of the funding policy, the Board may chose to eliminate by adjusting the rates for each group, while leaving the average rate unchanged.

Although no changes are required to the Plan's average rate, the table below shows that the change in the theoretically required contribution rate for each individual group, calculated as the sum of the change in the group's entry age normal cost and the change in the overall PBSA amortization requirement, is different, and that the average of these changes, if applied unadjusted, would cause the average current rate to increase. As the average contribution rate by definition must be unchanged, it is necessary to adjust each group's theoretical change downwards by the amount of this average increase. The net result (the theoretical group rate change less the average rate change) is the required rebalancing adjustment, or the amount that the

[1] Integrated.

employer rates for each group should be adjusted so that the group is paying the correct share of the overall cost. The detail of the calculation is shown below. These rates are "integrated", i.e. each of the member and employer share is reduced by 1.5% of salary up to the YMPE.

Imbalance in Employer Contribution Rates based on Level (i.e. Non-doubling) Equivalents

	Group 1 %	Group 4 %	Group 2 %	Group 5 %	Groups 1/4/2/5 Average %
1. Current contribution rates	18.87%	19.29%	22.96%	25.88%	19.57%
2. Increase in theoretical rate per group before rebalancing (change in entry age normal cost, plus change in overall amortization)	0.07%	(0.01%)	0.25%	0.49%	-
3. Resultant total rate per group = (1) + (2)	18.94%	19.28%	23.21%	26.37%	19.62%
4. Adjustment due to average of (3) exceeding average of (1)	(0.05%)	(0.05%)	(0.05%)	(0.05%)	(0.05%)
5. Net employer imbalance by group = (2) + (4)	0.02%	(0.06%)	0.20%	0.44%	-

The above table indicates that the employer rates for all Groups are "out of balance" in the sense that, while the average contribution rate is unchanged, the theoretical costs for Groups 1, 2 and 5 have increased, while the theoretical cost for Group 4 has decreased. Therefore, if the current employer rates are not adjusted, Groups 1, 2 and 5 will be paying less than their theoretically correct share of the total costs, while Group 4 will be paying more.

The Board may wish to rebalance the employer rates by group so that each group is paying their theoretical requirement. To rebalance the rates, Group 1, 2 and 5 employer rates should increase by 0.02%, 0.20% and 0.44% respectively, while employer rate for Group 4 should decrease by 0.06%. A similar rebalancing exercise was carried out following the 2012 valuation.

Income Tax Act Requirements

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 ½ of the amount that is required to fund the aggregate benefits in respect of which those contributions are made".

For Groups 1, 2 and 4, the required member contribution rate of 8.50% of salary up to the YMPE and 10.00% of salary above the YMPE exceeds the 9% limit for members earning more than $82,350 in 2016, so it will be necessary to apply to the Minister for an exemption. The required employer contributions, on an equivalent non-doubling basis, are 10.07% for Group 1, 10.49% for Group 4 and 14.16% for Group 2 (including net IAA contributions of 0.20%). All exceed the member contributions of 10.00%. As IAA contribution rates are fixed and per the requirements of the JTA any future employer Basic contribution rates will never be less than the member rates, the requirement that the member contributions will not exceed half of the amount required to fund the aggregate benefits is met.

The member contributions for Group 5 exceed 9% of salary for all members (11.94% of salary integrated) and thus a waiver is required for these contributions. The corresponding Group 5 non-doubling employer contribution rate of 15.98% (Basic contribution = 15.36% plus net IAA contribution of 0.62%) is higher than the current member rate, and, per the Joint Trust Agreement, the employer contributions to Group 5 can never be less than the member contributions. It is therefore reasonable to conclude that the requirement that the member contributions will not exceed half the amount required to fund the aggregate benefits is met.

Similar exemptions were required, and obtained, following the 2012 valuation.

5. Further Transitional Adjustments and Other Plan Changes

After setting aside surplus to ensure that the required contribution rate does not change and making the JTA required transfer to the RSA, there are no further funds available to progress with any other transitional objectives.

6. Accrued Benefits - Funded Ratio

This 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 for existing members are excluded from the comparison. The results are shown below.

Schedule 5 - Accrued Benefits - Funded Ratio at December 31, 2015

Basic Account - Non-Indexed Benefits

	($000's)	
	2015	**2012**
Fund (Basic Account): smoothed value of assets	**34,328,875**	**24,818,411**
Accrued Liabilities		
- for pensions being paid	14,809,764	11,411,717
- for inactive members	2,306,249	1,777,817
- for active members	16,178,415	13,530,735
Total Accrued Liabilities	**33,294,428**	**26,720,269**
Surplus (Unfunded Liability): for accrued service only	**1,034,447**	**(1,901,858)**
Funded Ratio: Fund ÷ Total accrued liabilities	**103.1%**	**92.9%**
Assets transferred to RSA	(1,927,301)	
Adjusted Surplus (Unfunded Liability) after RSA transfer	(892,854)	

The above schedule indicates that the funded ratio for accrued benefits has increased from about 92.9% to 103.1%, prior to the transfer to the RSA. This is largely for reasons similar to the items in the analysis in Schedule 2, 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 December 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 discount rate 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	16,178,415	19,162,260	2,983,845
Disabled members	1,211,691	1,413,336	201,645
Terminated members	1,094,558	1,273,068	178,510
Pensioners and beneficiaries	14,809,764	16,144,263	1,334,499
Total increase in liabilities			**4,698,499**

Impact on normal cost rate of 1% drop in discount rates	Going Concern 6.25%	Going Concern 5.25%	Increase
Entry age normal cost	16.55%	20.04%	3.49%

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 Discount Rate on Plan Funding

	($000's)		
	6.25%	**5.25%**	**Increase**
Smoothed Value of Fund	34,328,875	34,328,875	0
Actuarial present values of:			
▪ Future contributions at entry-age rates	13,390,928	17,867,638	4,476,710
▪ Present value of existing amortization	2,945,200	3,078,004	132,804
Total Assets prior to RSA transfer	**50,665,003**	**55,274,517**	**4,609,514**
Assets transferred to RSA	(1,927,301)	0	1,927,301
Total Assets after RSA transfer	**48,737,702**	**55,274,517**	**6,536,815**
Total Liabilities	**48,440,929**	**57,497,679**	**9,056,750**
Surplus/(Unfunded liability) on entry-age basis	296,773	(2,223,162)	(2,519,935)
Entry Age Normal Cost – average	16.55%	20.04%	3.49%
PBSA Amortization	3.01%	5.77%	2.76%
Additional amortization for Group 5	0.23%[1]	0.23%[1]	0.00%
***PBSA* Minimum rate – Schedule 3 – average**	**19.57%**	**25.82%**	**6.25%**

8. Supplementary 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. In the indexing calculations, we reduced the employer contributions to the IAA by 0.8% on the assumption that 0.8% of salaries would be allocated to the post-retirement group benefits.

The key results are summarized below:

[1] The Group 5 amortization of 0.23% of Group 5 payroll is 0.01% of the Plan's total payroll.

Schedule 6 - Indexed Benefits (without tax limits)

Funded position	Basic Only	Basic + Indexed
	($000's)	($000's)
Smoothed Value of Fund	34,328,875	39,846,324
Actuarial present values of:		
▪ Future contributions at entry-age rates	13,390,928	18,213,528
▪ Present value of existing amortization requirements		
(i) 1.06% to 2018	299,600	299,600
(ii) 1.75% to 2024	1,374,448	1,374,448
(iii) 1.25% to 2027	1,260,777	1,260,777
(iv) 0.23% (Basic Only)/0.31% (Basic + Indexed) to 2024 for Group 5 only	10,375	13,983
Total Assets prior to RSA transfer	**50,665,003**	**61,008,660**
Assets transferred to RSA	(1,927,301)	(1,927,301)
Total Assets after RSA transfer	**48,737,702**	**59,081,359**
Total Liabilities	**48,440,929**	**64,638,649**
Surplus (Unfunded Liability) including existing amortization	**296,773**	**(5,557,290)**
Present value of existing amortization (items (i), (ii) and (iii) above)	(296,773)[1]	(2,934,825)
Surplus (Unfunded Liability) to be amortized over 15 years	**0**	**(8,492,115)**
Contribution Rates (Integrated)	**%**	**%**
Member – current	9.08	10.11
Employer – current	10.49	10.71
Total – current, average	**19.57**	**20.82**
Entry-age normal cost – average	16.55	21.67
Amortization for all members[2]	3.01	6.99
Additional amortization for Group 5 members	0.23[3]	0.31[4]
Total – entry-age basis – average	**19.57**	**28.68**

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:

[1] For the Basic Only results, this represents the value by which the existing amortization scheuldes can be reduced.

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

[3] The Group 5 amortization of 0.23% of Group 5 payroll is 0.01% of the Plan's total payroll.

[4] The Group 5 amortization of 0.31% of Group 5 payroll is 0.02% of the Plan's total payroll.

Schedule 7 – Indexed Accrued Benefits (without tax limits) – Funded Ratio at December 31, 2015

	($000's)	
	Basic Only	**Basic + Indexed**
Assets	34,328,875	39,846,324
Liabilities	33,294,428	44,406,926
Surplus (Unfunded Liability)	**1,034,447**	**(4,560,602)**
Funded Ratio	103.1%	89.7%
Assets transferred to RSA	(1,927,301)	(1,927,301)
Adjusted Surplus (Unfunded Liability) after RSA transfer	(892,854)	(6,487,903)

Pensions Limited to *ITA* Maximums

When the income tax limits on pensions are recognized, the above 2015 unfunded liabilities change marginally.

Schedule 8 – Pensions Limited to ITA Maximums – Basic Only

Basic Only	**Without Tax Limit**	**With Tax Limit**
Surplus (Unfunded Liability) before RSA transfer	**$000's**	**$000's**
Entry Age Basis (including scheduled amortization)	2,224,074	2,450,308
Accrued Service Only (no scheduled amortization)	1,034,447	1,254,892
Surplus (Unfunded Liability) after RSA transfer	**$000's**	**$000's**
Entry Age Basis (including scheduled amortization)	296,773	523,007[1]
Accrued Service Only (no scheduled amortization)	(892,854)	(672,409)
Contribution Rate	**%**	**%**
Entry-age normal cost	16.55	16.48
PSBA Amortization	3.01	2.72
Additional amortization for Group 5 members	0.23[2]	0.24[3]
Total	**19.57**	**19.21**

[1] Assumes a transfer to the RSA of $1,927,301 i.e. the amount as per the Basic Without Tax Limit results.

[2] The Group 5 amortization of 0.23% of Group 5 payroll is 0.01% of the Plan's total payroll.

[3] The Group 5 amortization of 0.24% of Group 5 payroll is 0.01% of the Plan's total payroll.

Schedule 9 – Pensions Limited to ITA Maximums – Indexed Benefits – after RSA Transfer

Basic and Indexed	Without Tax Limit	With Tax Limit
Surplus (Unfunded Liability)	**($000's)**	**($000's)**
Entry Age Basis (including scheduled amortization)	(5,557,290)	(5,256,983)
Entry Age Basis (excluding scheduled amortization)	(8,492,115)	(8,191,808)
Accrued Service Only (no scheduled amortization)	(6,487,903)	(6,196,919)
Contribution Rate	**%**	**%**
Entry Age Normal Cost	21.67	21.58
15 year Amortization	6.99	6.74
Additional amortization for Group 5 members	0.31[1]	0.31[1]
Total	**28.68**	**28.34**

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. Since the plan has an unfunded liability on the entry-age basis, this restriction does not apply.

The tax rules also require that employer contributions not exceed the normal cost rate plus amounts necessary to amortize an unfunded liability.

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 has been provided since January 1, 1982 under the present Plan terms, and for many years before that under earlier Plan provisions. As discussed earlier, indexing is currently financed on a mixture of a pay-as-you-go basis (from a matching 1% for Groups 1, 2 and 4 and 1.42% for Group 5 member/employer contribution for active members, less employer contributions allocated to post-retirement group benefits), an excess investment return basis (investment return in excess of the valuation assumption is transferred each year from Basic to IAA in respect of pensioner liabilities), and a "terminally-funded" basis (each year the full capitalized cost of any indexing granted is transferred from IAA to Basic). 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, would apply.

[1] The Group 5 amortization of 0.31% of Group 5 payroll is 0.02% of the Plan's total payroll.

The recommended average rate of 20.82% (required rate of Basic Account of 19.57% plus net IAA contribution of 1.2% for Groups 1, 2 and 4 and 2.04% for Group 5) is lower than the 21.58% fully indexed normal cost rate (as shown in Schedule 9). Further, 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 a significant unfunded liability. For purpose of this test, the total assets should include the $1,927,301,000 transferred to RSA. Amortizing this revised unfunded liability of $6,264,507,000 (With Income Tax Limits Unfunded liability excluding amortization of $8,191,808.000 from Schedule 9, less $1,927,301,000) over 15 years results in an amortization requirement of 5.16%. Thus a contribution rate of 26.76%[1] would be acceptable for *ITA* purposes, and in fact for *ITA* purposes the unfunded liability could be amortized even faster, resulting in an even higher acceptable rate. It is therefore clear that the recommended rate is significantly lower than the maximum rate that is acceptable under the *ITA* and therefore, contributions may increase to recommended rates.

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

[1] Entry Age Normal Cost of 21.58% plus 0.02% representing the 0.31% additional amortization for Group 5 members only, as shown in Schedule 9, plus 5.16% 15-year amortization of $6,264,507,000 unfunded liability.

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	16.55%
IAA contributions – current average	1.25%
Additional IAA contributions from January 1, 2019	1.06%
Long term funding commitment - excluding current amortization schedule	**18.86%**

2. Results

We have calculated that the 2015 sustainable indexing level to be 2.10% per year. This result is an increase from the equivalently calculated 2012 sustainable indexing level of 1.95%.

Allowing for indexing of 2.10% 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	**2.10%**
Assets	
Market Value of Fund	43,311,222
Asset Smoothing Adjustment	(2,165,561)
Smoothed Value of Fund	**41,145,661**
Actuarial present values of contributions at Entry Age Normal Cost[1]	14,973,022
Total Assets	**56,118,683**
Assets transferred to RSA	(1,927,301)
Assets after RSA transfer	**54,191,382**
Total Liabilities	**56,688,543**
Surplus (Unfunded Actuarial Liability)	**(2,497,161)**
Add value of PBSA basic amortization requirement	
(i) 0.01% to 2018	2,807
(ii) 1.75% to 2024	1,346,502
(iii) 1.25% to 2027	1,227,223
(iv) 0.23% to 2024 for group 5 only	10,164
Less value of 3 years delay of 1.06% IAA contribution increase	(297,502)
Total amortization adjustment	**2,289,194**
Surplus (Unfunded Actuarial Liability) after adjustment	**(207,967)**
Contribution Requirements	
Entry Age Normal Cost - based on sustainable indexing target	18.77%
Amortization of (surplus)/unfunded liability over infinite period	0.07%
Required contribution	**18.84%**
Long term contribution commitment	**18.86%**

The above results show that, at an indexing rate of 2.10% per year, the required contribution rate is 18.84% of pay, which is marginally less than the long term contribution commitment of 18.86%[2]. It is thus reasonable to conclude that indexing of 2.10% per year can be sustained in the long term. We recommend that the

[1] This allows for indexing at 2.10% and reflects a 6.5% discount rate.

[2] Increasing the sustainable indexing limit to even 2.11% would result in a required contribution in excess of the long term contribution commitment, i.e. indexing at 2.15%, the next higher limit after 2.10% in terms of the funding policy, is not sustainable and 2.10% is the highest indexing that can be sustained.

maximum indexing amount referred to in Section 73 of the plan rules be set at not more than 2.10% per year. This is an increase from the level of 1.95% per year based on 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 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.

V. 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.

VI. 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 December 31, 2018.

VII. 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,

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September 22, 2016

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

Changes to the Plan

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

- **Purchase of Service Deadline:** Effective January 1, 2013, the plan rules were amended to allow members a 30-day window following termination of employment to apply to purchase eligible service. For non-contributory and leave of absence periods, the 30-day window still applies to the termination of employment from the employer with whom the event occurred.
- **Rights and Obligations in Workforce Restructuring:** Effective January 1, 2013, section 3.2 was added to the plan rules regarding transfers of active member groups between plan employers. This section ensures members do not lose entitlements because their employer has been restructured or sold, and the plan continues to receive contributions at the appropriate levels.
- **Separate Pension Benefits:** Effective January 1, 2014, part 16 was added to the plan rules concerning employment in more than one benefit group or with more than one employer. This new part sets out the principle to deem a member as a separate member when they participate in multiple benefit groups and directs how to treat the member's salary and service.
- **New *Wills, Estates and Succession Act* (WESA):** Effective March 31, 2014, the plan rules were amended to ensure compliance with the enactment of the new WESA by implementing all nomination of beneficiary changes required under WESA, including changes around who can be nominated as a beneficiary for pension purposes and how nominations can be made. 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 (e.g. organizations, charities, trusts)whose only option is to receive a lump sum payment.
- **Contribution Rate Changes:** Effective July 1, 2014, member and employer contribution rates were amended. The contribution rate to the basic account for members and employers increased by 0.70 per cent of salary. Additionally, the employer contribution rates were amended as follows: increasing the Group 1 employer contribution rates by 0.06 per cent of salary; increasing the Group 5 employer rate by 0.35 per cent of salary; and decreasing the Group 2 employer rate by 0.20 per cent of salary.
- **Amending Agreement No. 2:** Effective October 10, 2014, section 4 was added to Schedule B of the Municipal Pension Plan Joint Trust Agreement. This sets a reduction in the contribution rate to the basic account of 1.06 per cent of salary and a corresponding increase in the contribution rate to the inflation adjustment account (IAA) effective January 1, 2019. It also specifies how surplus assets

identified in the actuarial valuation of the plan as at December 31, 2015, if any, shall be allocated between a contribution rate stabilization account established within the basic account and the IAA.

- **Purchasing Leaves of Absence:** Effective April 1, 2015, section 41(2) of the plan rules was repealed and replaced to allow the purchase of a leave of absence (or period of reduced pay) if a member contributed to different employers under this plan or another registered pension plan during the period, subject to Income Tax Regulation limits.
- **Re-employment Retired Member:** Effective June 24, 2015, section 74 was repealed and replaced to make it clear that where a member commences their pension and later becomes re-employed in an employment that would normally require or offer participation in the plan, the retired member must continue to receive their pension and cannot recommence contributions to the plan. The amendment also clarifies that the provision does not apply where the member is receiving a pension from the plan following the death of a member.
- **New *Pension Benefits Standards Act* (*PBSA*):** Effective September 30, 2015, the plan rules were amended to implement all changes required under the new *PBSA* and Regulation. This included new and modified definitions and the incorporation of required benefit changes such as immediate vesting, change to the small benefit test, unlocking of pension benefits based on a medical practitioner's determination that the member has an illness or disability that is terminal or will considerably shortened their life expectancy, and a change to the interest rate calculation on voluntary contributions.

The Plan

The main provisions of the plan as at December 31, 2015 are summarized below. Except as otherwise noted, the section references are to the plan rules. The valuation is based on these provisions.

Employer and Employee Eligibility

The plan applies to employers described under section 2 of the plan rules: a municipality, a body designated under the *College and Institute Act*, teaching universities as designated under the *University Act,* and any other body designated as an employer on terms and conditions of eligibility specified by the Municipal pension Board of Trustees (board) or former board. The board retains the authority to set additional terms and conditions limiting or expanding the employee enrolment requirements applying to the individual employer. In general, plan employers include municipalities, regional districts, health services organizations, school districts and regional colleges.

Participation is compulsory for all regular, full-time employees and for other employees who have been working in a continuous full-time capacity with the same employer for 12 months. Enrolment is optional for less than full-time employees who have completed at least 2 years of continuous employment and have earned at least 35 per cent of the Year's Maximum Pensionable Earnings (YMPE) under the Canada

Pension Plan in each of two consecutive calendar years. Employees can be enrolled earlier than the plan requires if the employer passes a resolution or if the terms of a collective bargaining agreement provide for it. Where an active member transfers from the service of one employer to another employer, with a break in service of less than one month, contributions must continue without interruption. [Section 3]

Employees are classified as follows:

(a) Group 1 if male, other than a police officer or firefighter, whose normal retirement age is 65;

(b) Group 2 if a police officer or firefighter, whose normal retirement age is 60;

(c) Group 3 if a female whose last contribution to the fund prior to April 1, 1971 was made as a Group 3 member and who, with the approval of her employer, had elected to remain in Group 3 before November 30, 1971, whose normal retirement age is 60;

(d) Group 4 if a female, other than a Group 2 or 3 member, whose normal retirement age is 65; or

(e) Group 5 if a police officer or firefighter, who has a higher benefit accrual rate and whose normal retirement age is 60. [Section 96(1)]

Member Contributions

Section 5 defines the following contributions (effective July 1, 2014), which are deducted from a member's salary during a calendar year.

For members in Groups 1, 2, 3, and 4:

(a) 7.50 per cent of the member's salary that does not exceed the YMPE (paid into the basic account);

(b) 9.00 per cent of the member's salary in excess of the YMPE (paid into the basic account); and

(c) 1.00 per cent of the member's salary (paid into the IAA).

For members in Group 5:

(a) 9.02 per cent of the member's salary that does not exceed the YMPE (paid into the basic account);

(b) 10.52 per cent of the member's salary in excess of the YMPE (paid into the basic account); and

(c) 1.42 per cent of the member's salary (paid into the IAA).

Member contributions cease after 35 years of pensionable service have been accrued, with the exception of contributions made under certain special agreements entered into under Part 15.

Employer Contributions

Section 6 requires every employer to contribute the following amounts during a calendar year:

(a) for Group 1 members who have not reached age 50, 6.08 per cent of the cumulative salary that does not exceed the YMPE, and 7.58 per cent of the cumulative salary which is in excess of the YMPE; for Group 1 members who have reached age 50, 10.98 per cent of the cumulative salary that does not exceed the YMPE, and 12.48 per cent of the cumulative salary in excess of the YMPE (paid into the basic account);

(b) for Group 2 members who have not reached age 45, 7.78 per cent of the cumulative salary that does not exceed the YMPE, and 9.28 per cent of the cumulative salary which is in excess of the YMPE; for Group 2 members who have reached age 45, 16.28 per cent of the cumulative salary that does not exceed the YMPE, and 17.78 per cent of the cumulative salary which is in excess of the YMPE (paid into the basic account);

(c) for Group 3 members who have not reached age 45, 6.60 per cent of the cumulative salary that does not exceed the YMPE, and 8.10 per cent of the cumulative salary which is in excess of the YMPE; for Group 3 members who have reached age 45, 12.20 per cent of the cumulative salary that does not exceed the YMPE, and 13.70 per cent of the cumulative salary which is in excess of the YMPE (paid into the basic account);

(d) for Group 4 members who have not reached age 50, 6.52 per cent of the cumulative salary that does not exceed the YMPE, and 8.02 per cent of the cumulative salary which is in excess of the YMPE; for Group 4 members who have reached age 50, 11.92 per cent of the cumulative salary which does not exceed the YMPE, and 13.42 per cent of the cumulative salary which is in excess of the YMPE (paid into the basic account);

(e) for Group 5 members who have not reached age 45, 9.85 per cent of the cumulative salary that does not exceed the YMPE, and 11.35 per cent of the cumulative salary which is in excess of the YMPE; for Group 5 members who have reached age 45, 18.35 per cent of the cumulative salary which does not exceed the YMPE, and 19.85 per cent of the cumulative salary which is in excess of the YMPE (paid into the basic account);

(f) 1 per cent of the member's salary (paid into the IAA) for Groups 1, 2, 3 and 4 members; and

(g) 1.42 per cent of the member’s salary (paid into the IAA) for Group 5 members.

Employer contributions to the IAA are reduced by amounts allocated to post-retirement group benefits. [Section 75]

Employer contributions cease in respect of a member's salary after the member has accrued 35 years of pensionable service, with the exception of contributions made under certain special agreements entered into under Part 15.

Termination Benefits

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. The date the benefit is payable depends on the service accruals to termination – see below "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 is below age 55 (50), subject to the commuted value being payable on a locked-in basis.

Under certain limited conditions (small pensions, non-resident status) the *PBSA* permits the election of a lump-sum pay-out, 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 or to December 31, 1980 if earlier, in accordance with changes in the pension index. Subsequent to 1980, the highest average salary is increased to retirement by the percentage increase granted to pensions for the period between the month of termination and the month the pension becomes effective.

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

Retirement Benefits: Eligibility Conditions for Pension

There are different retirement ages for the five different member Groups in the plan. The normal retirement age is 65 for members in Groups 1 and 4, and 60 for members in Groups 2, 3 and 5. In the following summary of the various eligibility conditions and plan provisions, the age and/or service conditions are first shown for Groups 1 and 4; the age and/or service conditions for Groups 2, 3 and 5, if different, are shown in parentheses following the Groups 1 and 4 conditions.

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

(a) age 55 (50) and the sum of the member's age plus years of contributory service is 90 (80) or more; or

(b) age 60 (55) with at least 2 years of contributory service; or

(c) age 65 (60).

Section 51(a) provides for a reduced pension calculated under section 55(1) if the terminating member has attained age 55 (50) and completed at least 2 years of contributory service.

Section 51(b) provides for a reduced pension calculated under section 55(2) if the terminating member has attained age 55 (50) but has not completed 2 years of contributory service.

Section 13 provides that, under certain conditions, the contributory service requirements mentioned above can include service during certain periods of child rearing (5 year maximum).

Calculation of Unreduced Pension

Section 54 provides that the unreduced lifetime monthly pension payable to a member terminating employment on or after April 1, 2000 in the form of a single life annuity without a guarantee period 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) 1.3 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 pension

  multiplied by the number of years of pensionable service accrued on and after January 1, 1966 not exceeding 35 years, and

(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 on and after January 1, 1966 not exceeding 35 years.

For the purposes of the above calculation, in respect to any period of pensionable service for which contributions have been made at the rate applicable for Group 5, the percentages referenced in paragraphs (b) and (c) above are 1.63 per cent and 2.33 per cent respectively.

If the member has, before April 1, 2002, purchased pensionable service for service before the date on which the plan first applied to the member's employer, and has not accrued 35 years of pensionable service after the date that the plan first applied to the employer, the percentages used in the formula referenced in paragraphs (a) and (b) above for that purchased service are 1.75 per cent and 1.05 per cent respectively.

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) 0.7 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

(b) the number of years of pensionable service on and after January 1, 1966 not exceeding 35 years.

Highest average salary means one-twelfth of the average annual salary earned by a member during the 60 months of pensionable service (not necessarily consecutive) in which the salaries were highest (or, if the member has accrued less than 60 months of pensionable service, the total number of months of pensionable service).

A member who has made voluntary additional contributions in the past (these are no longer accepted) will be granted an increase to their pension or a refund, including interest at fund interest rates on those contributions. Members who have contributed under a pre-2007 special agreement will be granted a retirement annuity or a lump-sum payment of the member's account balance. Members who have contributed under a post-2006 special agreement will be granted a lump-sum payment of the member's account balance.

Calculation of Reduced Pension

Where a reduced pension is payable under section 51 to members aged between 55 (50) and 60 (55) who have 2 or more years of contributory service, section 55 provides that the lifetime pension and bridge benefit, described above, are each reduced by a percentage equal to 3 per cent for each year by which the member's age is less than the earlier of age 60 (55) or the age at which the member's age plus years of contributory service total 90 (80) (subsection 55(1)), prorated for fractions of a year.

Where a reduced pension is payable under section 51 to members aged 60 (55) or over who do not have 2 years of contributory service, section 55 provides that the lifetime and temporary pensions, described above, are each reduced by a percentage equal to 3 per cent for each year by which the member's age is less than 65 (60) years of age (subsection 55(2)), prorated for fractions of a year.

If employment terminates under age 50 (45), or between 50 (45) and 55 (50) with less than 10 years of contributory service, the 3 per cent (per year) early retirement reduction factor referred to above is increased to 5 per cent (per year) (subsection 55(3)).

Alternative Types of Pensions

Section 56 provides that a pension may be granted on the single life option with no guarantee period (normal form), single life option with a guarantee period (5, 10 or 15 years), joint life and last survivor option, temporary life annuity option, or a combination of these options upon approval of the plan administrative agent. 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, as a minimum, to elect that 60 per cent of the member's basic pension be paid on the joint life and last survivor option, unless the spouse

waives this requirement in writing or there is a written agreement or court order filed with the plan administrative agent. 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 section 96.

Disability Benefits

Section 60 provides that a member is entitled, upon application, to a disability pension if the member, before reaching age 60 (55), is totally and permanently disabled, has completed 2 years of contributory service, is not eligible for a monthly income benefit from a group disability plan, has not accepted a lump sum payment in lieu of a continued monthly income benefit under a group disability plan, and has terminated employment.

An eligible member is entitled to receive a lifetime pension calculated as the sum of the accrued pension based on the actual service to the date of termination of employment, and 50 per cent of the pension the member would have accrued between the pension effective date and age 60 (55) based on their current salary with service, pro-rated for members who work less than full-time, with both portions not reduced for immediate (i.e. early) retirement. Part 6 outlines the provisions related to disability benefits.

Sections 12(6) 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. An active member receiving benefits from a group disability plan continues to accrue deemed service under a group disability plan where an employer withdraws from the plan or the group disability plan loses approved status.

Pre-retirement Death Benefits

The pre-retirement death benefits for active and inactive plan members are covered in Part 7 as follows:

(a) If there is no surviving spouse or a valid spousal waiver has been filed, the benefit payable to the beneficiary is an amount equal to the greater of a refund of member's contributions with interests at the refund interest rates 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 (50) 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 interests at the refund interest rates and the full commuted value of the regular pension earned to the date of death; or

(ii) an immediate pension that is actuarially equivalent to the full commuted value of the regular pension earned to the date of death and payable as if the member had chosen the joint life and last survivor option.

(c) If the member has attained age 55 (50) 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 as though the member had terminated employment at the date of death and had chosen the joint life and last survivor option.

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.

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 IAA. The portion of the pension eligible for adjustment is the total amount of the pension, including any previous cost of living benefit, less any portion of the pension that is a result of voluntary contributions (which are no longer permitted). The maximum increase is equal to the percentage increase in the Consumer Price Index (CPI) over the 12 months ending on September 30 of the previous year.

Indexing is not guaranteed. Once granted, an indexing adjustment becomes part of the basic pension. The board annually considers all relevant factors to determine if indexing will be granted. Future indexing adjustments are granted at the discretion of the board.

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 IAA on the preceding September 30; and

(d) the capitalized value of all cost of living benefits granted annually is transferred from the IAA to the basic account.

The Pension 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 IAA, the supplemental benefits account (SBA) and the retirement annuity account (RAA);

(b) the **Inflation Adjustment Account**, consisting of:

(i) the 1 per cent contribution by each of the members under section 5(1)(a)(iii) and the 1.42 per cent contributions by each of the members under section 5(1)b(iii);

(ii) the matching employer contributions under section 6(1)(c) and (d) less amounts allocated for the payment of post-retirement group benefit entitlements;

(iii) the net investment income earned on the IAA;

(iv) the income, as determined by the plan administrative agent, that is earned on 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; and

(v) amounts transferred to the account from the RAA under section 75(5)

less:

(vi) amounts transferred to the Basic Account in respect of capitalized cost of living benefits granted under section 73 and 88;

(vii) refunds to plan members in respect of the 1 per cent contribution made to this account under section 5(1)(a)(iii) and the 1.42 per cent contribution made to this account under section 5(1)(b)(iii), or amounts otherwise transferred out of this account in respect of member and employer contributions allocated to this account;

(viii) 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;

(ix) 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

(x) amounts transferred to the SBA, if any, to cover inflation protection on benefits in excess of those registrable under the *Income Tax Act* (*ITA*);

(Article 10.3 of the Joint Trust Agreement also permits the board, subject to the transitional funding arrangements, 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 *ITA,* including post- retirement group benefits; and

(d) the **Retirement Annuity Account**, consisting of voluntary contributions made under the previous statutes, contributions made under special agreements, and investment earnings thereon, less amounts transferred to the basic account and the IAA for the retirement annuity portion of the benefits paid.

ITA Limits

The *ITA* 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, the SBA covers the financing and payment of benefits in excess of those registrable under the *ITA*.

The excess benefits are paid on a current cash basis, by allocating from the regular employer contributions, the amounts necessary to maintain the SBA 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/IAA are inclusive of the allocations to/from the SBA; in general, the allocations to/from the SBA have not been referenced.

We have also completed supplementary 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 at December 31, 2015 (before application of any early retirement reductions, where applicable) is the lesser of:

(a) $2,818.89 multiplied by the years of service; and

(b) 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.

The plan also imposes a 35 year cap on accruals at the above maximum rate. The 2016 maximum limit is $2,890.00 which is increased annually by the increase in the average industrial wage.

Refund Interest Rates

In accordance with section 96, for periods on and after January 1, 1993, and before 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 B14045. For periods on or 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.

Special Agreements

Under Part 15, a special agreement is an agreement entered into by the board with an employer which provides for employer and member contributions in excess of those required under sections 5 and 6 for the purpose of increasing the benefits of the members employed by the employer. Under the *ITA* the terms of each special agreement constitute a money purchase provision. [Sections 107 and 108]

Member and employer contributions are made at the rates set in each special agreement, subject to the maximum amounts allowable under the *ITA*. The contributions are paid into the RAA and credited to the member's account for whom they are made. The member's account holds the accumulated value of the special agreement contributions made for the member, together with interest at the fund interest rates. Employer contributions immediately vest in the member for whom they are made. A special agreement may require that member and employer contributions continue to be paid after the member has accrued 35 years of pensionable service. Contributions to a special agreement must stop when he or she becomes a member in group 5. [Sections 109 and 110]

Under section 112, a terminating member who elects to receive a commuted value as a termination benefit must be paid a lump sum payment of the member's account balance. If the member does not elect to receive a commuted value as a termination benefit, the member's account remains within the RAA until the member becomes entitled to a retirement benefit.

Section 113 provides that if a member elects to receive a pension as a retirement benefit, the member is entitled to:

(a) a lump sum payment of the member's account balance under a pre-2007 special agreement, or

(b) a monthly retirement annuity converted from the member's account balance under a pre-2007 special agreement commencing at the same time and payable under the same option and conditions as the pension granted under part 5, and

(c) a lump sum payment of the member’s account balance under a post-2006 special agreement.

If a member qualifies for a disability pension, section 114 provides that the member is entitled to:

(a) a lump sum payment of the member's account balance under a pre-2007 special agreement, or

(b) a monthly retirement annuity commencing at age 60 (55) converted from the member's account balance under a pre-2007 special agreement and payable under the same option and conditions as the pension granted under Part 6, and

(c) a lump sum payment of the member's account balance under a post-2006 special agreement.

If the member elects to receive a monthly retirement annuity but dies before reaching age 60 (55) the member's beneficiary is entitled to a lump sum payment of the member's account balance under a pre-2007 special agreement. If the disability pension continues to the member's spouse, the spouse may choose either the lump sum payment or an immediate monthly retirement annuity converted from the member's account balance under a pre-2007 special agreement.

Under section 115, if a member dies before taking a benefit from the plan, the member's beneficiary is entitled to a lump sum payment of the member's account balance. If there is a surviving spouse and he or she elects to receive a pension under Part 7, the spouse may choose either the lump sum payment or an immediate monthly retirement annuity converted from the member's account balance under a pre-2007 special agreement or a lump sum payment of the member's account balance under a post-2006 special agreement. If a refund is payable, the payment may be transferred to an RRSP as permitted by the *ITA*.

Section 117 provides that if an inactive member elects to transfer the member's contributory and pensionable service to another pension plan under a transfer agreement entered into by the board, the member must be paid a lump sum payment of the member's account balance.

A monthly retirement annuity paid under this Part is paid from the basic account as a lifetime pension with a capitalized value equal to the member's account balance at the end of the month preceding the commencement of the annuity. When a monthly retirement annuity commences payment under this Part, the member's account balance is transferred from the RAA to the basic account and the IAA and the member's account ceases to exist.

Other Items

1. Article 3.2 of the Joint Trust Agreement provides that all expenses incurred in the administration of the plan are to be paid from the fund.
2. 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]
3. 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. The SRIP must stipulate the eligible members, the period it will remain open, the conditions applicable to the incentives, the additional costs to the employer, the timing of these payments to fund the SRIP and restrictions under the *ITA*.
4. 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). This replaced the Public Sector Transfer Agreement. Under the NTA, transfers under the agreement take into account the benefits under the transferring plans and pro-rate service if

the importing plan's reserve requirements are higher than those available from the exporting plan. Members may pay for any shortfall, subject to Canada Revenue Agency approval, within certain deadlines. Members can choose to leave their entitlements with their respective plans and apply for the appropriate benefits available from each plan at termination and/or retirement.

Funding and Transitional Rules

These are covered in Article 10 and Appendix B of the Joint Trust Agreement.

Plan funding must comply with the *PBSA* requirements for a going-concern valuation. Further, if an actuarial valuation indicates a requirement to increase contribution rates to the basic account, the increase must be shared equally by members and employers.

The use of emerging surpluses is also limited during a transition period to achieve the following objectives, in the following order:

(a) First, eliminate any unfunded liabilities that existed at a prior valuation;

(b) Next, simultaneously

(i) rebalance member and employer contribution rates to the basic account, such that

(A) the current doubling feature is removed,

(B) the employer rates for Groups 1 and 4 members are set equal to the 5.0/6.5 per cent rate for members, and

(C) the employer rates for Groups 2 and 3 members are also set equal to the foregoing 5.0/6.5 per cent rate plus the differential in the normal cost rates for Groups 2 and 3 vs. that for Groups 1 and 4, as indicated by the actuarial valuation from time to time;

and

(ii)

(A) improve the normal form of pension from a single life without guarantee to a single life with a ten-year guarantee, and

(B) change the benefit formula from 1.3/2.0 per cent to 1.35/2.0 per cent,

for those who are active members at the date (and active members that join after the date) the improvements are implemented.

The surplus needed for this must be sufficient to stabilize the revised contribution rates on an open group basis, for a 25 year period.

(c) After (a) and (b) are achieved, 50 per cent of any additional or emerging surpluses will be allocated to a contribution rate stabilization reserve and the other 50 per cent transferred to the IAA, until an aggregate total of one billion dollars has been so allocated.

The JTA rules were amended effective October 10, 2014 to provide that, notwithstanding anything to the contrary:

- Effective January 1, 2019, the Basic Account contributions shall be reduced by 1.06% of salary and the Inflation Adjustment Account contributions will be increased by 1.06% of salary. The decrease in the Basic Account contribution rate and the increase in the Inflation Adjustment Account contribution rate shall be shared equally by the active members and the employers.
- If Schedule 1 Statement of Actuarial Position of the December 31, 2015 actuarial valuation of the Plan identifies that there are surplus assets, those surplus assets shall be dealt with as follows:
    - a contribution rate stabilization account shall be established within the Basic Account in an amount up to but not exceeding $2.5 billion; and
    - any surplus assets in excess of $2.5 billion shall be allocated to the Inflation Adjustment Account up to but not exceeding an amount which will fund full indexing based on the long term inflation rate assumed in the 2015 sustainable indexing valuation.

The transitional arrangements do not address Group 5.

The transitional period ends when the foregoing objectives have been achieved.

Appendix B: Actuarial Methods and Assumptions

The significant actuarial assumptions are summarized below, along with those used at the previous valuation:

	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	▪ 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	▪ 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	▪ 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)	▪ Assets carried at smoothed market values ▪ Smoothed value restricted to a range of 95% to 105% of Market Value
Costing Method	▪ Contributions are based on an entry-age funding approach	▪ 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 these 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 partly as if they would continue to earn service credits and ultimately receive a pension from the Plan, and partly as if they would again become contributing members of the Plan.

The liability for the inactive group (including those entitled to deferred vested pensions) 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 generally set equal to their accumulated refund values (in some cases, depending on the member's status, we held twice the refund value).

The valuation assets consist of:

(i) The Basic Account;

(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; and

(iii) The present value of any existing amortization requirements established at previous valuations.

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 three years prior to the valuation date 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 salaries.

Groups 2 and 5 do not have enough new entrants in each group to base the normal cost on; we have therefore used the combined Group 2 and Group 5 new entrant profile in calculating the Group 2 and Group 5 normal cost.

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 salaries, as follows:

1) If the result is an unfunded liability amortize it over the 15 year period commencing January 1, 2017[1]; and

2) If the result is a surplus (the result of a gain since the last valuation), those surplus assets shall be dealt with as follows:

    - A contribution rate stabilization account (RSA) shall be established within the Basic Account in an amount up to but not exceeding $2.5 billion; and
    - Any surplus assets in excess of $2.5 billion shall be allocated to the Inflation Adjustment Account up to but not exceeding an amount which will fund full indexing based on the long term inflation rate assumed in the 2015 sustainable indexing valuation.
    - These amounts will be the amount by which the Basic Account asset balance (taken into account when calculating the required Basic contribution rates) needs to be reduced in order that the required Basic contribution rate remains unchanged.

3) Apply any remaining gain after the RSA and IAA transfers to reduce the previously identified unfunded liabilities, starting with the oldest established. If, after removing all previously established amortization amounts there is still a surplus, amortize the remaining surplus over 25 years.

In calculating the required contribution rate for Group 5 when it was established, allowance needed to be made for the fact that initially members transferred from Group 2 and will therefore entered the group at an age that was older than the assumed entry age. As a result, the value of the future contributions was less than the value of the future benefits to be earned and there was be an initial unfunded liability. This unfunded liability was taken into account in the 2009 valuation when calculating the Group 5 contribution rate and was amortized over 15 years from December 31, 2009. We assumed that the same amortization amount will continue for the 2012 valution and also for this valuation, now payable for 9 years.

As has been done since the 2000 valuation, we report the required costs on a level basis, as opposed to a "doubling" basis.

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

The actuarial procedures applied in this valuation 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 December 31, 2015 were prepared by the Pension Corporation for 180,433 active members, 84,800 pensioners, 8,201 members receiving benefits from a long-term disability plan, 20,762 terminated members eligible for a vested pension, 15,305 other inactive members (including 17 on leave of absence) plus a further 266 non-retired individuals with very limited data, 34,703 active member terminations and 5,147 pensioner terminations during the period January 1, 2013 to December 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 salaries, we reduced the total salary base by 10% to reflect the part-time employment (the same adjustment was applied at the previous valuation).

The active member data included 7,002 persons who had no salary or service reported for 2015, or with a last-contribution-date prior to December 2015. We excluded them from the active member base, but have

included them with the inactive group. For 3,018 of them (those with at least 3 years of service, contributions after 2013 and basic employee contributions with interest balances of at least $1,500), we held a liability calculated as if they were would be reactivated on January 1, 2016 (we set their salaries equal to the average salaries for active members in the same age-group category). For 2,000 persons (those with a basic employee contributions with interest balance of at least $1,500 and 2 or more years of service, but not eligible to be reactivated) we held a liability equal to twice their basic employee contributions with interest balance. For the remaining 1,984 persons (i.e. those with basic employee contributions with interest balances of less than $1,500 or less than 2 years of service), we held the basic employee contributions with interest balance, since the bulk of these persons terminated prior to the plan being amended for immediate vesting. We excluded a further 6 active 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.

Salary details were inappropriate (missing, very low, or very high) for a further 213 active members. We assumed that these 213 members had the same average earnings as for other actives in the same age-group category.

There were 851 female members in the active data for Groups 2, 3 and 5. As in 2012, we did not separate the Group 3 actives, and simply left them with the Group 2 females[1]. We did, however, continue to value the Group 2 females separately from the males, and show a combined figure for the Group 2 members.

The liability for 7,907 of the members on long-term disability was calculated in two steps. We first calculated a liability as if these individuals would ultimately collect deferred vested pensions starting at age 62 for Groups 1 and 4 (unchanged from 2012) and age 57 for Group 2 and 5 (unchanged from 2012) with deferred pensions on the basis of service projected to retirement date (maximum 35 years) 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-group category). We also calculated a liability as if these members would again become contributing members of the plan. In order to allow for the possibility of recoveries from disability we set the liability equal to 80% of the former figure plus 20% of the latter figure. A similar approach was used in the previous valuation, except the disabled/recovery percentages used were 75% and 25% respectively. We excluded 294 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.

We divided the 20,762 terminated members entitled to a vested pension into two classes:

[1] Group 3 has been closed to new entrants since November 30, 1971, and we determined that only 2 of the 851 females had at least 44 years of credited service and could reasonably have been in Group 3.

(i) Those with missing, invalid or inconsistent detail, or whose basic employee contributions with interest balances were less than $1,500; and

(ii) All other inactive members.

The liability for the first group was held as twice their basic employee contributions with interest balance. For the second group, we calculated liabilities on the assumption that 100% of these members would receive vested pensions. This approach was unchanged from the previous valuation.

We divided the 15,305 other inactive members into three classes:

(i) Those whose basic employee contributions with interest balances were at least $1,500, and who are on leave of absence or who have returned to work after the valuation date;

(ii) Those with missing, invalid or inconsistent detail, or whose basic employee contributions with interest balances were less than $1,500, or who had less than 3 complete years of service, or who did not contribute in 2014 or 2015, or who were known to have taken a refund after the valuation date; and

(iii) All other inactive members.

We calculated liabilities on the assumption that the first and third groups would be reactivated on January 1, 2016, with assumed average salaries equal to the average salaries for active members in the same age-group category, and that the second group would take immediate refunds. For those in the second group with basic employee contributions with interest balance of at least $1,500 and 2 or more years of service, but who were not eligible (under our criteria) to be reactivated we held a liability equal to twice their basic employee contributions with interest balances. For the remaining persons in the second group (i.e. those with basic employee contributions with interest balances of less than $1,500 or less than 2 years of service), we held the basic employee contributions with interest balance. This was unchanged from the previous valuation.

With respect to the 266 remaining non-retired members with limited data, we held a liability equal to their basic employee contributions with interest balance.

Of the total pensioner data, there were 295 members excluded from the valuation because they died prior to the valuation date with no outstanding guaranteed pensions due or they were in receipt of a remaining guarantee only which rounded to zero months remaining, and hence their liability is zero.

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.

		Valuation Treatment							
	Pension Corp. Data	Pensioners with zero liability	Pensioners	Active Members	LTD	Vested	Re-activated	Refund CWI[1]	Refund 2 x CWI
Pensioners	84,800	295	84,505						
Active Members	180,433			173,425			3,018	1,984	2,006
Long Term Disability (LTD)	8,201				7,907				294
Terminated Vested	20,762					19,812			950
Inactive members	15,305						19	14,578	708
Limited data	266							266	
Total membership	**309,767**	**295**	**84,505**	**173,425**	**7,907**	**19,812**	**3,037**	**16,828**	**3,958**

3. Actuarial Assumptions

Investment Return and General Salary Increase Rates

Our actuarial valuation 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) Relationship to excess interest threshold

The 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] CWI = contributions with interest.

The previous valuation used a long-term investment return assumption of 6.5% per annum. As noted earlier, this also becomes 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 15.1% for 2013, 11.3% for 2014 and 8.7% for 2015. At December 31, 2015, approximately 63% of the total portfolio was invested in equities (including private placements), a further 14% in real estate, and the balance of 23% 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% (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	6.40%
Diversification and rebalancing effect	0.30%
Provision for investment related expenses	(0.25%)
Rounding	0.05%
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 consistent with the assumption of no added-value returns from active management.

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 3.5% 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%), 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 valuation result is discussed further below.

(e) Impact of investment return and salary assumptions on 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 3.00% underlying inflation; or 6.0% investment return and 3.25% salary, with 2.5% underlying inflation, etc. Thus, the underlying inflation assumption 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) Salaries

The 2015 valuation data indicates that average annual earnings increased by about 6.5% from mid-2012 to mid-2015 (i.e. about 2.1% 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 actual earnings during 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 also assumed that the YMPE under the Canada Pension Plan would increase at the general salary increase rate of 3.50% per year from its 2016 level of $54,900, both for the regular valuation and for the purposes of computing the entry-age costs. In the previous valuation we assumed that the YMPE would increase at the same rate of 3.75% per year from its 2013 level of $51,100.

Pension Indexing

(a) Basic Funding Valuation

Indexing adjustments on and after January 1, 1982 are 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 are currently fixed at 1% of salaries (1.42% for group 5) to be paid by each of the members and the employers, less amounts paid for post-retirement group benefits for pensioners. With respect to indexing adjustments granted through December 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 transfers to the Basic Account from the Inflation Adjustment Account to finance this indexing 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 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. A similar approach was used in the previous valuation.

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 December 31, 2013 to December 31, 2015.

As in the previous valuations, we have continued to apply a five year smoothing technique to these assets. We believe a smoothing approach is appropriate as it cushions the actuarial valuation results against the dramatic swings in market value which 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 the 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 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 December 31, 2015, and the prior lower constraint of 90% applied at December 31, 2014.

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

Total Fund Smoothing

	2013	2014	2015
1. Dec-over-Dec increase in CPI	1.2%	1.5%	1.6%
2. Base return = (1) + 3.5%	4.7%	5.0%	5.1%
Year-end asset values - $000's			
3. Market value	35,848,998	40,087,122	43,725,490
4. Smoothed value	32,345,696	36,078,410	40,227,452
5. Ratio of (4) ÷ (3)	0.902	0.900	0.920
Annual returns			
6. Market value	15.1%	11.3%	8.7%
7. Smoothed value	9.3%	11.0%	11.1%

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	30,291,127	33,985,169	37,313,995
9. Smoothed value	27,330,962	30,586,652	34,328,875
10. Ratio of (9) ÷ (8)	0.902	0.900	0.920
Retirement Annuity Account			
11. Market value	361,884	371,471	414,268
12. Smoothed value	326,519	334,324	381,128
13. Ratio of (12) ÷ (11)	0.902	0.900	0.920
Inflation Adjustment Account			
14. Market value	5,195,987	5,730,482	5,997,227
15. Smoothed value	4,688,215	5,157,434	5,517,449
16. Ratio of (15) ÷ (14)	0.902	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

of assets. This lower constraint applied as at December 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

We examined the 2013-2015 mortality experience and compared this with the experience observed in our previous analyses of the mortality rates and with the rates used in the previous valuation. In general, the actual experience showed fewer deaths than were indicated on the basis of the rates used in the previous valuation. We therefore adjusted the mortality rates to allow for the improvements in mortality of the members. In addition, the Canadian Institute of Actuaries published the results of a study of Canadian specific pension plan mortality in February 2014. The CIA report included a 2014 Public Sector Mortality Table (CPM2014Publ) and an improvement scale CPM Improvement Scale B (CPM-B). We reviewed the recent mortality experience of the Plan against both the base mortality table and the improvement scale. We found both to be a good fit, but also observed that the recent number of deaths for males has been higher than implied by the CPM2014Publ table, and the experience for females below age 80 has been lower than implied by the CPM2014Publ table. As a result, we made an adjustment to the rates underlying that table as follows:

(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 105% for males of the rates in the 2014 Public Sector Mortality Table (CPM2014Publ), and 90% for females below age 80 and 100% for females age 80 and over of the rates of CPM2014Publ, all projected using CPM Improvement Scale B (CPM-B).

(b) The previous valuation used 70% for males and 75% for females of the respective rates in the 1994 Group Annuity Mortality Table.

(c) For Employees retired on account of disability we used 75% for males and 70% 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 75% 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.

(d) For deferred vested pensions, mortality was ignored during the deferral period before retirement. This same assumption was made in the previous valuation.

Withdrawal

We examined the rates of withdrawal for reasons other than death, retirement or disability over the period January 1, 2013 to December 31, 2015 and compared this with the experience observed and the rates used for previous valuations. The observed rates for Group 4 in the first 3 years of service and for Group 2 and 5 in the third year were slightly lower than those assumed in the previous valuation, while the observed rates for Group 1 after 3 years of service were slightly higher than assumed in the previous valuation. As a result, we have made modest 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
	1st year	2nd year	3rd year	
Group 1	100%	100%	100%	105%
Group 2 and 5	100%	100%	90%	100%
Group 4	95%	95%	95%	100%

Sample withdrawal rates are shown in the following tables.

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

Age at entry	2015 valuation			2012 valuation		
	1st year	2nd year	3rd year	1st year	2nd year	3rd year
Group 1						
20	.155	.143	.119	.155	.143	.119
30	.103	.106	.090	.103	.106	.090
40	.074	.069	.056	.074	.069	.056
50	.067	.056	.041	.067	.056	.041
Group 2 and 5						
20	.026	.022	.019	.026	.022	.021
30	.019	.014	.011	.019	.014	.012
40	.009	.007	.006	.009	.007	.007
Group 4						
20	.122	.128	.114	.128	.135	.120
30	.103	.112	.082	.108	.118	.086
40	.059	.057	.050	.062	.060	.053
50	.059	.057	.039	.062	.060	.041

B. Withdrawal Rates Applicable After 3 Years of Service

Attained age	2015 valuation			2012 valuation		
	Group 1	Group 2 and 5	Group 4	Group 1	Group 2 and 5	Group 4
23	.086	.014	.115	.082	.014	.115
33	.049	.008	.049	.047	.008	.049
43	.026	.005	.029	.025	.005	.029
53	.016	-	.018	.015	-	.018

The withdrawal rates we have used do not extend past 10 years below the normal retirement age for each group.

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. We examined the combined experience of members going on disability pensions and on long-term disability and made slight adjustments to the rates from those used in the previous valuation, resulting in marginal increases for Group 1 and marginal decereases in the rates for Groups 2, 4 and 5. 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 62 for Groups 1 and 4, and at age 57 for Groups 2 and 5 (or immediately, for those older than these ages). The same age 62 and 57 assumptions were 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.

Age	2015 valuation			2012 valuation		
	Group 1	Group 2 and 5	Group 4	Group 1	Group 2 and 5	Group 4
25	.0003	.0001	.0001	.0003	.0001	.0002
35	.0003	.0001	.0013	.0004	.0002	.0014
45	.0021	.0009	.0041	.0023	.0010	.0045
55	.0069	.0029	.0112	.0064	.0029	.0125

The rates used for this valuation are 180% for Group 1, 190% for Group 4 and 75% for Groups 2 and 5 of the respective rates used for the valuation of the Pension Plan for the Public Service of Canada as at March 31,

2011. The 2012 valuation used 145% for Group 1, 195% for Group 4 and 65% for Group 2 and 5 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 2013-2015 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 is reasonably consistent with the assumption used in the previous valuation; in most cases, actual experience was slightly lower. We gave partial recognition to the observed experience by adopting modest changes to the rates previously used for retirement.

We slightly reduced most of the rates of retirement for both unreduced and reduced pensions for Groups 1 and 4. For Groups 2 and 5, we slightly reduced the rates of retirement for reduced pensions and for unreduced pensions at ages 55 and 56, and slightly increased those for unreduced pensions below age 55 and at age 59.

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

Normal Retirement Age = 65

Age	Service	2015 valuation		2012 valuation	
		Group 1	Group 4	Group 1	Group 4
For unreduced retirement pensions					
55-59	rule-of-90	.53	.48	.58	.50
60	10	.40	.43	.43	.45
61	10	.20	.22	.23	.23
62	10	.20	.23	.23	.23
63	10	.20	.22	.22	.23
64	10	.23	.24	.28	.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	.04	.07	.05	.08
55-59	age plus service add to at least 80	.09	.11	.10	.13

Normal Retirement Age = 60

Age	Service	2015 valuation	2012 valuation
		Group 2 and 5	Group 2 and 5
For unreduced retirement pensions			
50-54	rule-of-80	.20	.18
55	10	.24	.26
56	10	.23	.25
57	10	.30	.30
58	10	.33	.33
59	10	.55	.50
60	0	1.00	1.00
For reduced early retirement			
50-54	at least 10 years, but age plus service add to less than 75	.05	.06
50-54	age plus service add to at least 75	.07	.09

It should 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 (60) only to those with 10 or more years of service, on the assumption that those with fewer than 10 years would not retire until the normal retirement age.

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 December 31, 2015 and on the graduated average salaries of the active members as of December 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 normal retirement age.

Age	2015 and 2012 valuations			
	Group 1	Group 2&5 males	Group 2&5 females	Group 4
25	.019	.026	.034	.022
35	.014	.011	.008	.011
45	.005	.009	.002	.007
55	.002	.008	.001	.003
60	.000	.000	.000	.001
65	.000	n/a	n/a	.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.

Proportion of Members Married at Death

We assumed that the surviving spouses of all vested members who die after their earliest retirement age 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 Municipal Population

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

Expenses

Administration expenses are paid out of the Municipal fund. Medical premium assistance for pensioners is carved out of the incoming employer Basic Account contributions, and is paid through the Supplemental Benefits Account. We have treated these as an on-going addition to the administration expense. The sum of these two amounts was 0.70%, 0.72% and 0.76% of salaries for 2013, 2014 and 2015 respectively. Projected administration expenses provided by the Pension Corporation for the next three years anticipate that administration expenses will increase to approximately 0.43% of salaries for the next three years.. Medical premium assistance for pensioners is also expected to increase due to increases in the pensioner population and expcted MSP premium growth, including growth as a result of MSP changes in 2017 when the couple rate will be amended to be double of the single rate effective January 1, 2017. We estimate the Medical premium assistance for pensioners to be approximately 0.41% of salaries for the next 3 years,

Accordingly, we increased the expense provision included as part of the normal actuarial costs in the determination of the required contribution rates under the entry-age funding method from 0.70% of salary used in the previous valuation to 0.85% of salary. We also included a provision for the present value of expenses in the statement of actuarial position. The same approach was used in the previous valuation.

It should be noted that these procedures do not properly value the liabilities for these post-retirement group benefits, i.e. medical premium assistance for pensioners, allocated from contributions made to the Basic Account; they merely include a provision for these costs on a pay-as-you-go basis, over the future working lifetime of the closed active membership.

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.

Other Items

1) 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.

2) *Recognition of child-rearing periods for pension eligibility*: We continued to assume that this would only affect female members, 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 between ages 55 and 59, from a rule-of-90 to a rule-of-88 (Group 4; for Groups 2, 3 and 5 females, at ages 50 to 54, to a rule-of-78), 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".

Schedule A of the Public Sector Pension Plans Act, 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, using a smoothed asset value of $39,846,324,000;
- 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. We loaded the pensions in pay by 1.0% to cover the actual January 1, 2016 indexing increase. 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 rates of 9% + 1% = 10% for Groups 1 to 4 and 10.52% + 1.42% = 11.94% for Group 5, integrated with the CPP (i.e. reduced by 1.5% of salaries below the YMPE). The employer contributions of 1% for Group 1 to 4 and 1.42% for Group 5 to the IAA were reduced by 0.8% to account for the carve-out of the non-pension (EHB and Dental) benefits. The 0.8% carve-out was based on the Board's funding policy that no more than 0.8% of the employers' IAA contributions (excluding the extra 0.42% contribution for Group 5) would be available to pay for post-retirement group benefits. A similar approach was used in the previous valuation.

Funding Valuation: *ITA* Maximum Pension Rule - Assumption Changes

As noted earlier, we have not applied the *ITA* 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 pensions limited to the *ITA* maximums.

The maximum annual pension currently permitted (in 2016) under the income tax rules is the lesser of:

(i) $2,890 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. The Plan also imposes a 35 year cap on accruals at the above maximum rate, which we have applied. For an individual in this Plan to be currently affected by the $2,890 maximum the final average salary must be very high and 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 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 limit after 2016. (At the previous valuation the corresponding dollar limit was $2,696.67 in 2013, and after 2013 was assumed to increase by the average wage increase of 3.75%.)

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.

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

Age group[1]	Active members December 31, 2015[2]			New entrants Jan 1, 2013 to Dec 31, 2015 and still active	
	Number	Average annual earnings[3] $	Average service (years)	Number	Average annual earnings[3] $
Group 1 (males - normal retirement age = 65)					
15-19	8	55,676	0.5	56	49,844
20-24	441	50,676	0.9	548	53,159
25-29	2,380	56,186	2.2	1,174	58,349
30-34	4,100	61,691	3.8	1,033	61,343
35-39	4,762	66,224	5.5	863	63,577
40-44	5,448	68,403	7.3	792	66,855
45-49	6,092	69,001	9.8	588	67,231
50-54	7,415	68,354	12.9	499	65,052
55-59	6,837	67,859	15.2	302	62,802
60 & over	5,332	66,777	14.6	129	66,934
Total	**42,815**	**66,441**	**9.9**	**5,984**	**62,032**
Group 4 (females - normal retirement age = 65)					
15-19	10	42,288	0.2	137	44,201
20-24	1,491	48,309	0.8	2,443	52,935
25-29	9,168	56,287	2.0	3,384	55,598
30-34	13,431	61,178	3.7	2,377	57,183
35-39	13,857	62,862	5.1	1,853	55,614
40-44	15,258	61,876	6.4	1,675	54,812
45-49	17,603	60,422	8.3	1,263	54,154
50-54	20,499	59,527	10.8	1,001	53,759
55-59	19,035	59,173	12.5	503	55,087
60 & over	13,361	57,997	12.9	168	55,704
Total	**123,713**	**59,900**	**8.2**	**14,804**	**54,957**
Total Groups 1 & 4	**166,528**	**61,582**	**8.7**	**20,788**	**56,994**

[1] Age nearest birthday at December 31, 2015 for actives and at entry for new entrants.

[2] In total, 6 actives excluded because of invalid data; 7,002 actives included with inactive data.

[3] Actual earnings in 2015 for those employed all year and annualized for others. Very low or very high earnings figures were replaced by the average earnings in the same age-group category.

Age group[1]		Active members December 31, 2015[2]		
	Number	Average annual earnings[3] $	Average service (years) with 2% benefit rate	Average service (years) with 2.33% benefit rate
Group 5 (males - normal retirement age = 60)				
20-24	29	63,597	0.2	0.7
25-29	345	77,458	0.8	2.1
30-34	805	86,566	2.8	2.9
35-39	905	92,309	5.6	3.4
40-44	1,058	97,904	9.1	3.5
45-49	1,115	105,198	13.7	3.5
50-54	852	113,357	18.6	3.4
55 & over	434	118,064	22.1	3.5
Total males	**5,543**	**99,313**	**10.4**	**3.3**
Group 5 (females - normal retirement age = 60)				
20-24	9	67,875	0.1	1.0
25-29	70	73,663	0.5	1.9
30-34	129	85,812	2.6	2.9
35-39	156	92,531	5.3	3.6
40-44	151	95,924	8.4	3.7
45-49	178	101,634	12.5	3.9
50-54	93	108,188	15.7	3.9
55 & over	29	108,624	16.1	4.1
Total females	**815**	**94,551**	**8.1**	**3.5**
Total Group 5	**6,358**	**98,702**	**10.1**	**3.3**

[1] Age nearest birthday at December 31, 2015 for actives and at entry for new entrants.

[2] In total, 6 actives excluded because of invalid data; 7,002 actives included with inactive data.

[3] Actual earnings in 2015 for those employed all year and annualized for others. Very low or very high earnings figures were replaced by the average earnings in the same age-group category.

Age group[1]	Active members December 31, 2015[2]			New entrants Jan 1, 2013 to Dec 31, 2015 and still active Groups 2 and 5 combined	
	Number	Average annual earnings[3] $	Average service (years)	Number	Average annual earnings[3] $
Group 2 (males - normal retirement age = 60)[4]					
20-24	5	52,722	0.9	82	66,153
25-29	24	63,566	2.1	215	70,154
30-34	54	74,276	4.4	128	71,259
35-39	72	80,319	7.3	48	69,489
40-44	94	91,449	11.5	12	79,194
45-49	92	91,791	14.3	12	79,866
50-54	89	98,825	18.6	15	113,428
55 & over	73	105,235	19.8	4	83,174
Total males	**503**	**89,665**	**12.6**	**516**	**71,525**
Group 2 (females - normal retirement age = 60)[4]					
20-24				27	67,723
25-29				26	70,914
30-34	6[5]	48,273	1.7	15	65,222
35-39	7	55,092	1.9	9	64,810
40-44	5	79,089	8.9	4[6]	78,878
45-49	6	61,106	15.8		
50-54	4	62,666	8.8		
55 & over	8	60,163	23.3		
Total females	**36**	**60,259**	**10.7**	**81**	**68,512**
Total Group 2	**539**	**87,701**	**12.4**	**597**	**71,116**
Total – All groups	**173,425**	**63,024**	**8.8**	**21,385**	**57,388**

Average age of the 173,425 acitves is 46.1.

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

2 In total, 6 actives excluded because of invalid data; 7,002 actives included with inactive data.

3 Actual earnings in 2015 for those employed all year and annualized for others. Very low or very high earnings figures were replaced by the average earnings in the same age-group category.

4 Group 2 data female subset includes 2 members with 44 or more years of service who are likely in group 3.

5 2 actives under 25 and 2 between 25 to 30 included in this group due to privacy.

6 2 new entrants over 45 included in this group due to privacy.

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

	Group 1	Group 4	Group 2	Group 5
At December 31, 2015				
- Number	42,815	123,713	539	6,358
- Proportion of total	24.7%	71.3%	0.3%	3.7%
- Average age (at 12.31)	47.0	46.0	44.3	42.2
- Average service	9.9	8.2	12.4	13.4
- Average salary	$66,441	$59,900	$87,701	$98,702
At December 31, 2012				
- Number	40,573	119,074	2,972	3,809
- Proportion of total	24.4%	71.5%	1.8%	2.3%
- Average age (at 12.31)	46.8	45.9	42.6	41.2
- Average service	9.9	8.0	13.4	12.8
- Average salary	$62,637	$56,448	$84,875	$88,262
Change 2012 to 2015				
- Number	+ 5.5%	+ 3.9%	- 81.9%	+66.9%
- Proportion of total	+ 0.3%	- 0.2%	- 1.5%	+1.4%
- Average age	+ 0.2 years	+ 0.1 years	+ 1.7 years	+ 1.0 years
- Average service	No change	+ 0.2 years	- 1.0 years	+ 0.6 years
- Average salary	+ 6.1%	+ 6.1%	+ 3.3%	+ 11.8%

The above comparison indicates an increase in the covered membership during the three year inter-valuation period of 4.2% in total. The proportion of males increased slightly. The average ages continue to increase for all Groups, notwithstanding the increase in the covered membership. As expected, there has been a significant shift in membership from Group 2 to Group 5.

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

	Group 1	Group 4	Groups 2/5
At December 31, 2015			
- Number	5,984	14,804	597
- Proportion of total	28.0%	69.2%	2.8%
- Average age at entry	37.5	35.1	30.4
- Average salary	$62,032	$54,957	$71,116
At December 31, 2012			
- Number	5,207	12,735	619
- Proportion of total	28.1%	68.6%	3.3%
- Average age at entry	37.7	35.3	30.0
- Average salary	$58,201	$52,628	$63,611
Change 2012 to 2015			
- Number	+14.9%	+16.2%	- 3.6%
- Proportion of total	- 0.1%	+ 0.6%	- 0.5%
- Average age	- 0.2 years	- 0.2 years	+ 0.4 years
- Average salary	+ 6.6%	+ 4.4%	+ 11.8%

There is an increase in the number of new entrants in the 2015 subset compared to the 2012 subset for Groups 1 and 4 and a decrease for Group 2/5. The average salary has increased for all Groups. The average age of new entrants for Groups 1 and 4 has slightly decreased and for Group 2/5 has slightly increased.

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

1. Inactive Members Assumed Reactivated on Valuation Date

Age group[1]	Group 1 (males)			Group 4 (females)		
	Number	Average annual earnings[2]	Average service (years)	Number	Average annual earnings[2]	Average service (years)
29 and below	18	56,694	3.1	123	56,805	3.3
30-34	47	62,256	4.3	486	61,327	4.3
35-39	68	66,325	6.0	469	62,883	5.5
40-44	79	68,393	7.1	301	61,897	5.9
45-49	85	68,930	8.2	314	60,462	7.3
50-54	76	68,354	10.7	302	59,517	9.1
55-59	76	67,838	13.3	275	59,197	10.7
60 & over	70	66,793	18.9	230	57,845	12.9
Total	**519**	**66,945**	**9.8**	**2,500**	**60,583**	**7.1**

Group[1]	Number	Average annual earnings[2]	Average service (years) with all benefit rate	Average service (years) with 2.33% benefit rate
Group 2(all males)	3	117,034	15.6	-
Group 5 (males)	11	107,868	20.2	2.2
Group 5 (females)	4	95,739	12.1	2.9

	Number	Average Age	Average annual earnings[2]	Average service (years)
Total - All Groups	**3,037**	**44.5**	**$61,944**	**7.6**

[1] Age nearest birthday at December 31, 2015.

[2] Assumed same earnings as for active members in same age-group category.

2. Members on Long-Term Disability with Projected Deferred Pensions

Age group[1]	Males		Females	
	Number	Average annual deferred pensions[2]	Number	Average annual deferred pensions[2]
29 & below	17	24,759	49	26,407
30-34	22	25,501	156	27,363
35-39	42	24,313	289	25,776
40-44	87	20,775	440	22,183
45-49	119	21,377	760	20,268
50-54	251	19,940	1,257	17,959
55-59	335	17,726	1,741	15,618
60 & over	411	16,167	1,931	13,644
Total	**1,284**	**18,646**	**6,623**	**17,256**

	Number	Average age	Average annual deferred pensions[2]
Total males & females	**7,907**	**54.0**	**$17,482**

[1] Age nearest birthday at December 31, 2015.

[2] Basic lifetime portions assumed payable from age 62; males include 11 Group 2/5 members and females include 4 Group 2/5 members with pensions assumed to commence from age 57; additional temporary pensions are payable to age 65.

3. Other Inactive Members Entitled to Vested Pensions and Not Assumed Reactivated

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
25-29	123	2,186	725	385	2,042	671
30-34	338	3,805	1,162	1,071	3,071	958
35-39	553	4,414	1,285	1,546	4,015	1,190
40-44	779	5,795	1,599	2,234	4,629	1,348
45-49	1,097	7,734	2,072	2,524	6,127	1,721
50-54	1,272	9,576	2,491	3,008	7,335	2,056
55-59	888	9,568	2,441	2,060	7,140	1,973
60 & over	570	7,328	1,855	1,364	6,275	1,762
Total	**5,620**	**7,446**	**1,976**	**14,192**	**5,737**	**1,630**

	Number	Average age	Average annual vested pension - initial	Average annual vested pension - Offset at age 65
Total males & females	**19,812**	**47.8**	**$6,222**	**$1,728**

4. Remaining Inactive Members

Number	Member contributions with interest
20,786[3]	$82,661,727

[1] Age nearest birthday at December 31, 2015.

[2] These pensions are assumed to commence at the first age at which the member is entitled to an unreduced pension, assuming no earlier than age 60(55) i.e. at various ages between 60(55) and 65(60).

[3] Includes 6 active, 294 disabled and 950 vested members with invalid data.

Appendix E: Pensioner Data at December 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 50	7	11	80	-	3	-
50-54	124	114	3,177	1,271	991	1,289
55-59	1,801	1,093	23,460	12,251	13,696	18,762
60-64	4,853	7,850	58,039	26,775	30,064	49,167
65-69	6,175	19,066	69,539	22,883	26,877	5,276
70-74	4,397	21,825	53,700	8,163	10,342	9
75-79	2,898	23,611	30,941	466	1,614	1
80-84	1,982	18,732	15,501	7	51	-
85-89	1,239	12,891	7,449	-	-	-
90 & over	537	7,391	2,306	-	-	-
Total	**24,013**	**112,584**	**264,192**	**71,816**	**83,638**	**74,504**
Female pensioners						
Less than 50	22	70	57	-	160	21
50-54	90	219	372	228	821	266
55-59	3,365	1,766	11,825	7,811	21,293	22,436
60-64	10,956	14,897	38,719	22,110	74,059	77,856
65-69	15,526	53,229	46,599	17,396	80,017	9,348
70-74	10,881	67,162	29,607	4,461	27,521	2
75-79	6,379	52,766	13,010	195	3,406	-
80-84	3,719	31,707	3,928	-	150	-
85-89	2,007	15,750	1,110	-	-	-
90 & over	927	8,894	221	-	-	-
Total	**53,872**	**246,460**	**145,448**	**52,201**	**207,427**	**109,929**
Grand Total	**77,885**	**359,044**	**409,640**	**124,017**	**291,065**	**184,433**

Supplemental pensions included in the above amounts are as follows:

Supplemental Pensions included	**776**	**3,465**	**1,291**	**1,680**	**-**

Average age of the 77,885 pensioners is 69.9.

[1] Age nearest birthday at December 31, 2015.

[2] These numbers include only those who were formerly contributors to the plan.

[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 50	28	181	7
50-54	42	377	16
55-59	88	765	54
60-64	149	1,313	39
65-69	270	2,489	214
70-74	297	2,821	152
75-79	307	2,740	75
80-84	220	1,739	-
85-89	139	1,061	-
90 & over	78	525	-
Total	**1,618**	**14,011**	**557**
Female beneficiaries			
Less than 50	46	453	-
50-54	63	962	22
55-59	190	2,967	273
60-64	331	5,113	495
65-69	480	7,801	586
70-74	548	8,047	124
75-79	676	9,556	28
80-84	800	10,782	16
85-89	821	10,744	-
90 & over	675	10,005	-
Total	**4,630**	**66,430**	**1,544**
Remaining guarantees	**372**	**-**	**5,068**
Grand Total	**6,620**	**80,441**	**7,169**

Supplemental pensions included in the above amounts are as follows:

Supplemental Pensions included	**232**	**10**

Average age of the 6,248 beneficiaries is 76.6.

[1] Age nearest birthday at December 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 cost figures shown herein are integrated and on a level, i.e. "non-doubling" basis and are combined member/employer rates.

Normal ("entry-age") actuarial cost portion	2015 (%)	2012 (%)
- Group 1 (males)	15.91	14.79
- Group 4 (females)	16.28	15.24
- Groups 1/4 combined	16.16	15.09
- Group 2 (males and females combined)	19.48	18.18
- Group 5 (males and females combined)	22.55	21.01
- Groups 1/4/2/5 average	**16.55**	**15.37**

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

	Group 1/4 %	Group 2 %	Group 5 %	Groups 1/4/2/5 average %
Normal cost at 2012 valuation	**15.09**	**18.18**	**21.01**	**15.37**
Data changes	(0.03)	(0.02)	(0.02)	0.04
Assumption changes:				
• Pre-retirement mortality	(0.01)	(0.02)	(0.02)	(0.01)
• Disability incident rates	0.00	0.00	0.00	0.00
• Withdrawal rates	(0.01)	0.00	0.00	(0.01)
• Retirement rates	(0.07)	(0.03)	(0.03)	(0.07)
• Post-retirement mortality	0.59	0.71	0.85	0.61
• Post-retirement mortality for disabled pensioners	0.06	0.02	0.02	0.06
• Economic assumptions	0.39	0.49	0.59	0.41
• Administration expenses	0.15	0.15	0.15	0.15
Total change	**1.07**	**1.30**	**1.54**	**1.18**
Normal cost at 2015 valuation	**16.16**	**19.48**	**22.55**	**16.55**

Calculation of Required Contribution Rate

	2015	2012
1. Normal (entry-age) actuarial cost - average	16.55%	15.37%
2. Unfunded actuarial liability on entry-age basis ($000's)	($721,126)	($3,489,626)
3. Assets transferred to RSA	(1,927,301)	n/a
4. Unfunded actuarial liability after transfer	(2,648,427)	(3,489,626)
5. Present value of existing amortization requirements ($000's)		
(i) 1.06% to 2018	299,600	519,972
(ii) 1.75% to 2024	1,374,448	1,592,191
(iii) 1.25% to 2027	1,260,777	n/a
(iv) 0.23% to 2024 for Group 5 only	10,375	7,140
6. Sum of 4. and 5.	296,773	(1,370,323)
7. Balance of unfunded liability to be amortized over 15 years ($000's) (= 6, or zero if 6. is greater than zero)	0	(1,370,323)
8. 15 year amortization of balance of unfunded actuarial liability		1.25%
9. Reduction to existing amortization (if 6. is greater than zero)	1.05%	
10. Total *PBSA* amortization requirement		
(i) to 2018	0.01	1.06
(ii) to 2024	1.75	1.75
(iii) to 2027	1.25	1.25
Total *PBSA* amortization	**3.01**	**4.06**
Additional Group 5 amortization to 2024	0.23[1]	0.23
11. Total *PBSA* minimum required contribution rate - average	**19.57**	**19.44**
12. Average current contribution rate	**19.57**	**18.05**
13. Required increase in contribution rate	**0.00**	**1.39**

The percentages are applied to members' total earnings and are integrated (i.e. reduced by 1.5% on members' salary up to the YMPE for each of the members and the employers, for a 3.0% total reduction).

[1] The Group 5 amortization of 0.23% of Group 5 payroll is 0.01% of the Plan's total payroll, hence the PBSA minimum rate of 19.57% = 16.55%+3.01%+0.01%.

Appendix G: Comparative Results

Comparative 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, without tax limits;
- Basic plus Indexed, without tax limits;
- Basic only, with tax limits; and
- Basic plus Indexed, with tax limits.

Schedule G1 - Statement of Actuarial Position as at December 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	37,313,995	43,311,222	37,313,995	43,311,222
Asset smoothing adjustment	(2,985,120)	(3,464,898)	(2,985,120)	(3,464,898)
Smoothed value of Fund	**34,328,875**	**39,846,324**	**34,328,875**	**39,846,324**
Actuarial present values of:				
future contributions at entry-age rates	13,390,928	18,213,528	13,329,545	18,130,534
present value of existing amortization				
(i) 1.06% to 2018	299,600	299,600	299,600	299,600
(ii) 1.75% to 2024	1,374,448	1,374,448	1,374,448	1,374,448
(iii) 1.25% to 2027	1,260,777	1,260,777	1,260,777	1,260,777
(iv) Group 5 only to 2024[1]	10,375	13,983	10,826	13,983
Total Assets	**50,665,003**	**61,008,660**	**50,604,071**	**60,925,666**
Assets transferred to RSA	(1,927,301)	(1,927,301)	(1,927,301)	(1,927,301)
Assets after RSA transfer	**48,737,702**	**59,081,359**	**48,676,770**	**58,998,365**
Liabilities				
Actuarial present values for:				
▪ pensions being paid	14,809,764	19,222,424	14,718,512	19,101,464
▪ inactive members	2,306,249	3,379,370	2,305,732	3,378,688
▪ active members	30,529,411	41,241,350	30,334,014	40,979,691
▪ future expenses	795,505	795,505	795,505	795,505
Total Liabilities	**48,440,929**	**64,638,649**	**48,153,763**	**64,255,348**
Surplus (Unfunded Actuarial Liability)	**296,773**	**(5,557,290)**	**523,007**	**(5,256,983)**
Present value of existing amortization (items (i) (ii)and (iii))		(2,934,825)		(2,934,825)
Surplus (Unfunded Liability) to be amortized over 15 years		**(8,492,115)**		**(8,191,808)**
Selected 2012 Comparisons				
Total Assets including amortization	39,418,046	48,051,892	39,363,100	47,973,108
Total Liabilities	39,418,046	54,077,899	39,180,443	53,750,107
Surplus (Unfunded Actuarial Liability)	0[2]	(6,026,007)[3]	182,657[4]	(5,776,999)[5]

[1] 0.23% for Basic without tax limit, 0.24% for Basic with tax limit and 0.31% for Basic + Indexed with and without tax limit.

[2] Prior to the 2012 amortization of 1.25% of salary, the unfunded liability was $1,370,323 thousand.

[3] Prior to the 2012 amortization of 1.25% of salary, the unfunded liability was $7,396,330 thousand.

[4] Prior to the 2012 amortization of 1.25% of salary, the unfunded liability was $1,187,666 thousand.

[5] Prior to the 2012 amortization of 1.25% of salary, the unfunded liability was $7,147,322 thousand.

Schedule G3 (1) - Current and Required Contributions Rates - December 31, 2015 - Basic only

		Without Tax Limits			With Tax Limits		
	Current contribution rates[1, 2]	**Member**	**Employer**	**Total**	**Member**	**Employer**	**Total**
1	Group 1	9.00	9.87	18.87	9.00	9.87	18.87
2	Group 4	9.00	10.29	19.29	9.00	10.29	19.29
3	Group 2	9.00	13.96	22.96	9.00	13.96	22.96
4	Group 5	10.52	15.36	25.88	10.52	15.36	25.88
5	**Average**	**9.08**	**10.49**	**19.57**	**9.08**	**10.49**	**19.57**
	Entry-age normal cost rates[1]						
6	Group 1			15.91			15.81
7	Group 4			16.28			16.23
8	Group 2			19.48			19.46
9	Group 5			22.55			22.51
10	**Entry-age normal cost - Average**			**16.55**			**16.48**
	Amortization of unfunded actuarial liability (surplus)						
11	15 year amortization			2.17			1.99
	PBSA amortization						
12	• to 2018			0.01			0.00
13	• to 2024			1.75			1.47
14	• to 2027			1.25			1.25
15	**Total *PBSA* amortization** (=12+13+14)			**3.01**			**2.72**
16	Additional Group 5 amortization (to 2024)[3]			0.23			0.24
	Total contribution rate[1]						
17	15 year amortization – Average			18.73			18.48
	***PBSA* minimum rate basis[4]**						
18	Group 1 (= 6+15)			18.92			18.53
19	Group 4 (= 7+15)			19.29			18.95
20	Group 2 (= 8+15)			22.49			22.18
21	Group 5 (= 9+15+16)			25.79			25.47
22	***PBSA* minimum rate - Average**			**19.57**			**19.21**
23	**Required Contribution Rate Increase – Average**			**0.00**			**n/a**

[1] Less 1.5% of salary up to the YMPE (for each of the members and the employers).

[2] The current rates are shown on an equivalent "non-doubling" basis, based on current payrolls.

[3] This amount was established at the 2009 valuation to allow for the fact that members transferring from Group 2 are older than the assumed entry age to Group 5 and therefore the value of their future contributions at the entry age rate is less than the value of the corresponding future liability. This amount amortizes the shortfall over 15 years from 2009.

[4] The total contribution rate to the plan needs to comply with the *PBSA* requirements. The *PBSA* does not apply at the group level.

Schedule G3 (2) - Selected 2012 Comparisons - December 31, 2012 - Basic only

		Without Tax Limits			With Tax Limits		
	Current contribution rates[1, 2]	**Member**	**Employer**	**Total**	**Member**	**Employer**	**Total**
1	Group 1	8.30	9.10	17.40	8.30	9.10	17.40
2	Group 4	8.30	9.61	17.91	8.30	9.61	17.91
3	Group 2	8.30	12.75	21.05	8.30	12.75	21.05
4	Group 5	9.82	13.74	23.56	9.82	13.74	23.56
5	**Average**	**8.35**	**9.70**	**18.05**	**8.35**	**9.70**	**18.05**
	Entry-age normal cost rates[1]						
6	Group 1			14.79			14.69
7	Group 4			15.24			15.18
8	Group 2			18.18			18.18
9	Group 5			21.01			21.00
10	**Entry-age normal cost - Average**			**15.37**			**15.30**
	Amortization of unfunded actuarial liability (surplus)						
11	15 year amortization			3.18			3.01
	PBSA amortization						
12	• to 2018			1.06			1.06
13	• to 2024			1.75			1.75
14	• to 2027			1.25			1.08
15	**Total *PBSA* amortization** (=12+13+14)			**4.06**			**3.89**
16	Additional Group 5 amortization (to 2024)[3]			0.23			0.24
	Total contribution rate[1]						
17	15 year amortization – Average (=10+11)			18.56			18.32
	***PBSA* minimum rate basis[4]**						
18	Group 1 (= 6+15)			18.85			18.58
19	Group 4 (= 7+15)			19.30			19.07
20	Group 2 (= 8+15)			22.24			22.07
21	Group 5 (= 9+15+16)			25.30			25.13
22	***PBSA* minimum rate - Average**			**19.44**			**19.21**
23	**Required Contribution Rate Increase – Average**			**1.39**			**n/a**

[1] Less 1.5% of salary up to the YMPE (for each of the members and the employers).

[2] The current rates are shown on an equivalent "non-doubling" basis, based on current payrolls.

[3] This amount was established at the 2009 valuation to allow for the fact that members transferring from Group 2 are older than the assumed entry age to Group 5 and therefore the value of their future contributions at the entry age rate is less than the value of the corresponding future liability. This amount amortizes the shortfall over 15 years from 2009.

[4] The total contribution rate to the plan needs to comply with the *PBSA* requirements. The *PBSA* does not apply at the group level.

Schedule G3 (3) - Current and Required Contributions Rates - December 31, 2015 - Basic + Indexed

		Without Tax Limits			With Tax Limits		
	Current contribution rates[1, 2]	**Member**	**Employer**	**Total**	**Member**	**Employer**	**Total**
1	Group 1	10.00	10.07	20.07	10.00	10.07	20.07
2	Group 4	10.00	10.49	20.49	10.00	10.49	20.49
3	Group 2	10.00	14.16	24.16	10.00	14.16	24.16
4	Group 5	11.94	15.98	27.92	11.94	15.98	27.92
5	**Average**	**10.11**	**10.71**	**20.82**	**10.11**	**10.71**	**20.82**
	Entry-age normal cost rates[1]						
6	Group 1			20.51			20.38
7	Group 4			21.46			21.38
8	Group 2			25.51			25.49
9	Group 5			29.82			29.76
10	**Entry-age normal cost - Average**			**21.67**			**21.58**
	Amortization of unfunded actuarial liability (surplus)						
11	15 year amortization			6.99			6.74
12	PBSA amortization			n/a			n/a
13	Additional Group 5 amortization (to 2024)[3]			0.31			0.31
	Total contribution rate[1]						
14	15 year amortization – Average			28.68			28.34

[1] Less 1.5% of salary up to the YMPE (for each of the members and the employers).

[2] The current rates are shown on an equivalent "non-doubling" basis, based on current payrolls.

[3] This amount was established at the 2009 valuation to allow for the fact that members transferring from Group 2 are older than the assumed entry age to Group 5 and therefore the value of their future contributions at the entry age rate is less than the value of the corresponding future liability. This amount amortizes the shortfall over 15 years from 2009.

Schedule G3 (4) - Selected 2012 Comparisons - December 31, 2012 - Basic + Indexed

		Without Tax Limits			With Tax Limits		
	Current contribution rates[1, 2]	**Member**	**Employer**	**Total**	**Member**	**Employer**	**Total**
1	Group 1	9.30	9.30	18.60	9.30	9.30	18.60
2	Group 4	9.30	9.81	19.11	9.30	9.81	19.11
3	Group 2	9.30	12.95	22.25	9.30	12.95	22.25
4	Group 5	11.24	14.36	25.60	11.24	14.36	25.60
5	**Average**	**9.37**	**9.91**	**19.28**	**9.37**	**9.91**	**19.28**
	Entry-age normal cost rates[1]						
6	Group 1			19.28			19.14
7	Group 4			20.40			20.32
8	Group 2			24.13			24.13
9	Group 5			28.17			28.16
10	**Entry-age normal cost - Average**			**20.41**			**20.32**
	Amortization of unfunded actuarial liability (surplus)						
11	15 year amortization			8.68			8.45
12	PBSA amortization			n/a			n/a
13	Additional Group 5 amortization (to 2024)[3]			0.31			0.31
	Total contribution rate[1]						
14	15 year amortization – Average			29.10			28.78

[1] Less 1.5% of salary up to the YMPE (for each of the members and the employers).

[2] The current rates are shown on an equivalent "non-doubling" basis, based on current payrolls.

[3] This amount was established at the 2009 valuation to allow for the fact that members transferring from Group 2 are older than the assumed entry age to Group 5 and therefore the value of their future contributions at the entry age rate is less than the value of the corresponding future liability. This amount amortizes the shortfall over 15 years from 2009.

Schedule G5 - Accrued Liabilities and Funded Ratio - December 31, 2015

Present Plan - ($000's)

($000's)	Without Tax Limits		With Tax Limits	
	Basic Only	Basic + Indexed	Basic Only	Basic + Indexed
Assets – smoothed value	**34,328,875**	**39,846,324**	**34,328,875**	**39,846,324**
Accrued Liabilities				
▪ pensions being paid	14,809,764	19,222,424	14,718,512	19,101,464
▪ inactive members	2,306,249	3,379,370	2,305,732	3,378,688
▪ active members	16,178,415	21,805,132	16,049,739	21,635,790
Total Accrued Liabilities	**33,294,428**	**44,406,926**	**33,073,983**	**44,115,942**
Surplus (Unfunded Actuarial Liability)	**1,034,447**	**(4,560,602)**	**1,254,892**	**(4,269,618)**
Funded Ratio – Fund ÷ Total Accrued Liabilities	**103.1%**	**89.7%**	**103.8%**	**90.3%**
Assets transferred to RSA	(1,927,301)	(1,927,301)	(1,927,301)	(1,927,301)
Adjusted surplus (unfunded liability) after RSA transfer	**(892,854)**	**(6,487,903)**	**(672,409)**	**(6,196,919)**
Selected 2012 Comparisons				
Assets	24,818,411	29,169,606	24,818,411	29,169,606
Total Liabilities	26,720,269	36,703,594	26,549,923	36,469,087
Surplus (Unfunded Actuarial Liability)	(1,901,858)	(7,533,988)	(1,731,512)	(7,299,481)
Funded Ratio	92.9%	79.5%	93.5%	80.0%