

Buck

500 Plaza Drive, 2nd. Floor
Secaucus, NJ 07096

Retirement Plan for CTA Employees

Actuarial Valuation Report as of January 1, 2018,
including supplementary disclosure information for
GASB Statement No. 67

August 2018

Board of Trustees and Executive Director
Retirement Plan for CTA Employees

August 21, 2018

Board of Trustees and Executive Director
Retirement Plan for CTA Employees
55 West Monroe St., Suite 1950
Chicago, IL 60603

Ladies and Gentlemen:

This report presents the results of the annual valuation of the assets and liabilities of The Retirement Plan for Chicago Transit Authority Employees ("the Plan") as of January 1, 2018, prepared in accordance with 40 ILCS 5/22-101(e). In addition, it includes disclosure information as of December 31, 2017, required under GASB Statement No. 67. The actuarial valuation of the Plan is performed annually and Buck Global, LLC ("Buck") was retained to perform the valuation as of January 1, 2018. This valuation has been conducted in accordance with all applicable Actuarial Standards of Practice (ASOPs) issued by the Actuarial Standards Board (ASB).

The actuarial valuation is based on unaudited financial and member data provided by the staff of the Plan and summarized in this report. The benefits considered are those delineated in the Plan and are governed by legislation contained in the Illinois Compiled statutes, particularly Chapter 40, as amended and restated effective December 31, 2012. The actuary did not verify the data submitted but did perform tests for consistency and reasonableness. The accuracy of the results contained in this report is dependent upon the accuracy of the data.

Public Act 95-708, effective January 18, 2008, required that the Plan's pension and retiree health care programs be separated into two distinct trusts by July 1, 2009 (40 ILCS 5/22-101B(a)). This January 1, 2018 valuation report for the Plan does not reflect the liabilities and assets that were spun off into the retiree healthcare trust.

Contribution rates were determined in accordance with 40 ILCS 5/22-101(e) using the projected unit credit cost method and, under the actuarial assumptions used in the valuation, are expected to produce a funded ratio of at least 60 percent no later than ten years after the valuation year through fiscal year end 2039. Contribution rates reflect the issuance of bond or notes by the Authority, as defined in 70 ILCS 3605/12c. Authority contribution rates are adjusted by a debt service credit, for debt service paid in the prior year, of up to six percent of compensation per year from 2009 to 2040, as defined in 40 ILCS 5/22-101(e)(2).

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Results of this valuation deviated from those that would have been projected based on the results of the January 1, 2017 actuarial valuation namely due to market returns of 14.4% compared to the 8.25% assumed rate of return. Overall this caused the funded ratio to meet the standards set forth in ILCS 5/22-101(e) and therefore there is no need to increase authority and employee contribution rates to comply with 40 ILCS 5/22-101(e). The rates will remain as follows:

Annual Contributions to the Plan (Percentage of Compensation)		
Fiscal Year	Authority	Employees
2019 to 2040	18.019%	12.010%

Based on these rates, the sum of current assets, net bond proceeds, future contributions and investment earnings, less benefit payments and expenses, assets held by the Plan are projected to be equal to at least 60 percent of actuarial liabilities by 2028 and through fiscal year end 2040, if these contributions, expressed as a percentage of compensation, are made to the Plan and the Plan experiences no net actuarial losses in the future.

40 ILCS 5/22-101(e)(4) provides for a minimum contribution, determined either by the Board of Trustees or the Auditor General, to bring the funded ratio of the Plan “up to” or “to no less than” 90% by December 31, 2059. The attached schedules shown in the report project the attainment of these required funded ratios.

While not required by 40 ILCS 5/22-101(e)(3), Buck has recommended that the Board of Trustees consider, as appropriate, moving towards contributing an amount equal to the Actuarial Math Contribution.

- Fund 100% of the entry age normal cost method
- Pay off the unfunded liability over 20 years using layered amortization

This methodology implies that a contribution of approximately 34.61% of payroll (total contribution) is appropriate.

The results documented in this report are estimated based on data that may be imperfect and on assumptions about future events. Assumptions may have been made about participant data or other factors. Reasonable efforts were made in this valuation to ensure that items that were significant in the context of the actuarial liabilities or costs are treated appropriately, and not excluded or included inappropriately. We believe that the use of approximation in our calculations, if any, has not resulted in a significant difference relative to the results we would have obtained using more detailed calculations.

A range of results, different from those presented in this report could be considered reasonable. The numbers are not rounded, but this is for convenience only and should not imply precision, which is not inherent in actuarial calculations.

This valuation was based on the actuarial assumptions and methods as approved by the Board of Trustees. Please see Section 6.2 and 6.3 of this report for a description of the assumptions and

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methods used. Actuarial Standards of Practice now require that the likelihood and extent of future mortality improvements be considered for valuations performed on or after June 30, 2011.

Traditionally for the CTA Retirement Plan, experience studies are performed once in every five year period. The mortality tables currently in use and adopted by the Board provide explicitly for some future mortality improvements. The most recent study of the plan's experience, used in developing the current actuarial assumptions, was based on a period from January 1, 2008 through December 31, 2012 and first used with the January 1, 2014 actuarial valuation; the next review will cover the period from January 1, 2013 through December 31, 2017. The assumed interest rate of 8.25% has been approved by the Board of Trustees. It is based upon a review of the existing portfolio structure, a review of recent experience, and future long-term expectations of rates of return. We believe that the economic and demographic assumptions adopted in accordance with the recent experience study and a review of recent experience are reasonable and appropriate for the purposes of this valuation.

All assumptions and methods used for this valuation are unchanged from those used in the prior valuation.

The assumptions and methods used to determine the Actuarial Math Contribution of the Plan as outlined in this report and all supporting schedules fulfill the requirements of Governmental Accounting Standards Board (GASB) Statement No. 67, *Financial Reporting for Defined Benefit Pension Plans and Note Disclosures for Defined Contribution Plans*. Based on member data and asset information provided by the CTA Retirement Plan staff, we have prepared the Schedule of Funding Progress and Schedule of Employer Contributions that are included in the Financial Section of the Comprehensive Annual Financial Report. Because of the risk of misinterpretation of actuarial results, Buck should be asked to review any statement you wish to make on the basis of the results contained in this report. Buck will accept no liability for any such statement made without our prior review.

Future actuarial measurements may differ significantly from the current measurement presented in this report due to such factors as: plan experience different from that anticipated by the economic and demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements; and changes in plan provisions or applicable law. An analysis of the potential range of such future measurements is beyond the scope of this report.

All the historical valuation results presented in this report represent results taken from prior actuarial reports, and results shown for some years may reflect funding methods and techniques used by the prior actuary. Our report/certification does not apply to those results, other than to represent that our report has presented accurate information developed by prior actuaries.

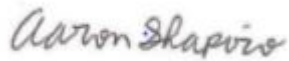
Where presented, the "funded ratio", "funded status" and "unfunded accrued liability" typically are measured using the actuarial value of assets. It should be noted that use of the market value of assets would result in different values of the funded ratio, funded status and unfunded accrued liability. Moreover, the funded ratio presented is appropriate for evaluating the need and level of future contributions but not for assessment of the funded status of the plan if it were to settle (i.e., purchase annuities to cover) a portion or all of its liabilities.

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I am a Fellow of the Society of Actuaries and a Member of the American Academy of Actuaries. I have met the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein and am available to answer questions about them.

In my opinion the calculations also comply with Illinois law, and where applicable, the Statements of the Governmental Accounting Standards Board. We certify that the information presented herein is accurate and fairly portrays the actuarial position of the Plan as of January 1, 2018.

Respectfully submitted,
Buck Global, LLC

A handwritten signature in dark ink, reading "Aaron Shapiro". The signature is written in a cursive, flowing style.

Aaron Shapiro, FSA, MAAA, EA
Principal and Consulting Actuary

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Membership

Actives: As of January 1, 2018, there were 8,192 members in active service covered under the provisions of the Plan. The significant age, service, salary and accumulated contribution information for these members is summarized below, along with corresponding figures from the last actuarial valuation one year earlier.

	January 1, 2018	January 1, 2017
Number of active employees ¹	8,192	8,129
Average age	48.5	48.6
Average years of service	13.4	13.6
Total annual valuation salary ²	595,046,668	575,443,885
Average annual salary ²	73,327	71,564
Total accumulated contributions	496,944,601	449,593,044
Average accumulated contributions	61,238	55,913

1 Active statistics include all participants who are actively employed which includes 26 participants who are on leave and 77 participants who have opted out of participating in the Plan and are only entitled to a return of their contributions.

2 The salary information for the 77 participants who have opted out of participating in the Plan is not included.

The number of active members increased by 0.8% from the previous valuation date. The average age of the active members decreased by 0.1 years, and the average service decreased by 0.2 years. The total annual valuation salary increased by 3.4%. The average salary increased by 2.46% from the previous valuation.

Distributions of active members by age and service are given in Section 5.2.

Inactives: In addition to the active members, there were 106 inactive vested members who did not elect to receive their accumulated contributions when they left covered employment. The significant age and annual benefit information for these inactive members is summarized below with comparative figures from the last actuarial valuation one year earlier.

	January 1, 2018	January 1, 2017
Number of inactive members	106	105
Average age	57.8	56.8
Average annual benefit payments	\$27,001	\$26,861

The number of inactive vested members increased by 0.95% from the previous valuation. The average age of the inactive vested members increased by 1.0 year. The Average Monthly Pension Benefit for these members increased by 0.5% from the previous valuation.

Distributions of inactive members by age and pension benefit are given in Section 5.4.

Retirees and Beneficiaries: In addition to the active and inactive members, there were 8,032 retired members, 1,222 members with disability allowances and 1,133 beneficiaries who are receiving monthly benefit payments on the valuation date. The significant age and annual benefit information for these members are summarized below with comparative figures from the last actuarial valuation performed one year earlier.

	January 1, 2018	January 1, 2017
Number of members receiving payments		
➤ Retirees	8,032	8,065
➤ Disability Allowances	1,222	1,178
➤ Beneficiaries	1,133	907
➤ Total	10,387	10,150
Average age	70.5	70.3
Annual benefit amounts		
➤ Retirees	\$235,381,155	\$231,877,188
➤ Disability Allowances	\$21,144,541	\$19,539,261
➤ Beneficiaries	\$13,299,612	\$10,627,755
➤ Total	\$269,825,308	\$262,044,204
Average annual benefit payments	\$25,977	\$25,817

The number of retired members and beneficiaries increased by 2.3% from the previous valuation date. The average age of these members increased by 0.2 years. The total annual benefit payments for these members increased by 3.0% from the previous valuation date.

Distributions of retired members by age and benefit amounts are given in Section 5.3.

Plan Assets

The Plan's assets are held in trust and invested for the exclusive benefit of plan members. The trust is funded by member and employer contributions and pays benefits directly to eligible members in accordance with plan provisions. The assets are audited annually and are reported at fair value. On a fair value basis, the Plan has Net Assets Available for Benefits of \$1,865.9 million as of January 1, 2018. This includes an increase of \$129.5 million over the Net Assets Available for Benefits of \$1,736.4 million as of January 1, 2017. During the prior year, the investment return was 14.4% as reported by the Plan.

Starting with the January 1, 2017 valuation, the Board of Trustees adopted an actuarial value of assets to be used for funding purposes. This method recognizes differences of asset returns from their expected levels over a period of five years. The Net Assets Available for Benefits on an Actuarial Value basis is \$1,802.2 million as of January 1, 2018. This includes an increase of \$49.7 million over the Net Assets Available for Benefits of \$1,752.5 million as of January 1, 2017. During the prior year, the investment return on an actuarial basis was 9.10%.

A summary of the assets held for investment, a summary of changes in assets, and the development of the actuarial value of assets is shown in Section 2.

Actuarial Experience

Differences between the expected experience based on the actuarial assumptions and the actual experience create changes in the actuarial accrued liability, actuarial value of assets, and the unfunded actuarial accrued liability from one year to the next. These changes create an actuarial gain if the experience is favorable and an actuarial loss if the experience is unfavorable. The Plan experienced a total net actuarial loss of \$17.5 million during the prior year. This net loss is about 0.5% of the plan's prior year actuarial accrued liability. The net loss is a combination of two principal factors, demographic experience and investment performance.

The demographic experience tracks actual changes in the plan's population compared to the assumptions for decrements such as mortality, turnover, and retirement, as well as pay increases. The Plan experienced a demographic loss of \$31.1 million during the year ending December 31, 2017. This loss increased the unfunded actuarial accrued liability by \$31.1 million and decreased the funded ratio by 0.48%.

Continued tracking of the demographic experience is warranted in order to confirm the appropriateness of the actuarial assumptions. Details of the demographic, economic, and other assumptions used to value the plan liabilities and normal cost can be found in Section 6. In our opinion, the economic assumptions comply with Actuarial Standards of Practice No. 27 and the demographic assumptions comply with Actuarial Standards of Practice No. 35.

On the asset side, the Plan experienced a gain on a fair value of assets basis. The actual rate of return on the fair value of plan assets was 14.4% for the year ending December 31, 2017 compared to the assumption of 8.25%.

The rate of return on the Actuarial Value of Plan Assets for the year ending December 31, 2017 was approximately 9.1% compared to the assumption of 8.25%, resulting in an asset gain of \$94.7 million. The actuarial value of the assets recognizes only 20% of the 2017 unexpected change in fair value, or \$23.7 million, delaying the recognition of the remaining 80% over the next four years. The gain, based on the actuarial methodology, decreased the unfunded actuarial accrued liability by \$23.7 million and increased the funded ratio by 2.8%. It should be noted that the Plan's assumed asset return of 8.25% is a long-term rate and short-term performance is not necessarily indicative of expected long-term future returns

A summary of the actuarial gains and losses experienced during the prior year is shown in Section 1.4.

Funded Status

The funded status is a measure of the progress that has been made in funding the plan as of the valuation date. It is determined as a ratio of the actuarial value of assets divided by the total actuarial accrued liability on the valuation date. The funded ratio presented is appropriate for evaluating the need and level of future

contributions but makes no assessment regarding the funded status of the plan if the plan were to settle (i.e. purchase annuities) for a portion or all of its liabilities.

As of January 1, 2018, the funded ratio of the Plan is 52.65%. This represents an increase of 0.16% from last year's funded ratio of 52.49% as of January 1, 2017. Unless otherwise noted, the funded status shown in the report is based on the projected unit credit cost method.

A history of the unfunded actuarial accrued liability and the funded ratio is shown in Section 1.5.

Statutory Contributions

Actual required contribution rates were determined in accordance with 40 ILCS 5/22-101(e) using the projected unit credit cost method and calculated to produce an expected funded ratio of at least 60 percent no later than ten years after the valuation year through fiscal year end 2039 and 90 percent funding by fiscal year end 2059. Contribution rates reflect the issuance of bond or notes by the Authority, as defined in 70 ILCS 3605/12c. Authority contribution rates are adjusted by a debt service credit, for debt service paid in the prior year, of up to six percent of compensation per year from 2009 to 2040, as defined in 40 ILCS 5/22-101(e)(2).

Actuarial Math Contributions

While not required by 40 ILCS 5/22-101(e), white papers on funding policies for public sector plans developed over the past few years suggest a funding policy be sufficient to pay the normal cost on the entry age normal cost basis and amortize the unfunded actuarial accrued liability over a fixed period of 20 years. We will broadly refer to this type of policy as an Actuarial Math Funding Policy. Buck has recommended that the Board of Trustees consider, as appropriate, moving towards contributing based on the Actuarial Math Funding Policy.

Under Actuarial Math, the normal cost represents the cost of the benefits that accrue during the year for active members under the Entry Age Normal Cost Method. It is determined as a level percent of pay over each individual career attributable to the respective plan year. The normal cost for 2018 has been determined to be \$52.4 million, or 8.8% of pay. This represents a decrease in the normal cost rate of 0.36% of pay from last year's normal cost rate of 9.16%.

Under Actuarial Math, the cost method under which the actuarial accrued liability is determined is the entry age normal cost method. Under the entry age normal cost method, the actuarial accrued liability (AAL) is equal to the present value of projected benefits less the present value of future benefits to be accrued. The AAL amount is compared to the actuarial value of assets to determine if the Plan is ahead or behind in funding as of the valuation date. The difference between the total actuarial accrued liability and the actuarial value of assets equals the amount of unfunded actuarial accrued liability or surplus (if negative) on the valuation date. This amount is amortized and added to the normal cost to determine the annual required contribution for the year suggested by public sector funding policy white papers.

The unfunded actuarial accrued liability under the entry age normal cost method as of January 1, 2018 is \$1,753.9 million. This represents an increase of \$64.0 million in the unfunded actuarial accrued liability from last year's amount of \$1,689.9 million. The annual payment required to amortize the unfunded actuarial accrued liability of \$1,753.9 million as of January 1, 2018 is \$145.6 million, or 24.46% of pay.

The total contribution suggested by actuarial math is the sum of the normal cost and the payment to the UAAL plus interest, or 34.61% of pay (8.8% of pay attributable to the normal cost plus 24.46% of pay attributable to the amortization of the unfunded plus 1.35% of pay for the mid-year interest adjustment).

The actuarial liabilities and development of the Actuarial Math Contribution is shown in the Comparative Summary and Section 1.1.

In our opinion, the measurement of the benefit obligations and determination of the actuarial cost of the Plan is performed in compliance with Actuarial Standards of Practice No. 4.

Accounting Information

The Governmental Accounting Standards Board (GASB) issues statements which establish financial reporting standards for defined benefit pension Plans and accounting for the pension expenditures and expenses for governmental employers. The required financial reporting information for the Plan and the Employer under GASB No. 67 can be found in Section 3 beginning on page 22.

Projections

As part of the annual actuarial valuation, a forecast of expected future valuation results is performed over a 50 year period beginning on the valuation date. This analysis provides a dynamic look into the future to identify trends in future employer contributions and funded status. The forecast replaces active members who are assumed to decrement (terminate, retire, etc.) during the period with new members resulting in a stable active membership. The forecast assumes all actuarial assumptions are exactly realized each year during the forecast period. The results of these forecasts can be found in Section 4.

Changes in Plan Provisions

There have been no significant changes in the plan provisions which changed the meaning of the Plan according to Plan Counsel since the last actuarial valuation performed as of January 1, 2017.

Changes in Actuarial Assumptions, Methods, or Procedures

There have been no changes in the actuarial assumptions, actuarial cost methods, asset method or valuation procedures since the last actuarial valuation performed as of January 1, 2017.

Comparative Summary of Key Actuarial Valuation Results

	January 1, 2018	January 1, 2017
1. Investment Return Assumption	8.25 %	8.25 %
2. Membership Data		
a. Active Employees		
Number	8,192	8,129
Annualized Salaries (in thousands)	595,047	575,444
Average Pay	73,327	71,564
b. Terminated Participants with Vested Benefits		
Number	106	105
Total Monthly Accrued Benefit	238,509	235,034
Average Monthly Accrued Benefit	2,250	2,238
c. Retirees and Beneficiaries		
Number	9,165	8,972
Total Monthly Pension	20,723,397	20,208,745
Average Monthly Pension	2,261	2,252
d. Disability Allowances		
Number	1,222	1,178
Total Monthly Pension	1,762,045	1,628,272
Average Monthly Pension	1,442	1,382
3. Statutory Minimum Contribution Rates (as a percentage of Payroll)¹		
a. Employer Contribution Rate		
Gross Employer Rate	24.019 %	24.019 %
Credit for Debt Repayment	6.000 %	6.000 %
Net Employer Rate	18.019 %	18.019 %
b. Employee Contribution Rate	12.010 %	12.010 %
4. Actuarial Math Contribution*		
a. Amortization Payment for UAAL		
i. Amount	145,575,279	140,266,284
ii. As a % of pay	24.46 %	24.38 %
b. Normal Cost		
i. Amount	52,383,996	52,692,641
ii. As a % of pay	8.8 %	9.16 %
c. Interest Adjustment to Mid-Year		
i. Amount	8,004,009	7,801,831
ii. As a % of pay	1.35 %	1.35 %
d. Actuarial Contribution		
i. Amount	205,963,284	200,760,757
ii. As a % of pay	34.61 %	34.89 %
5. Actuarial Funded Status (\$ in thousands)		
a. Actuarial Accrued Liability	3,423,218	3,338,641
b. Actuarial Value of Assets (AVA)	1,802,216	1,752,473
c. Unfunded Accrued Liability	1,621,002	1,586,168
d. Funded Ratio	52.6 %	52.5 %
e. Market Value of Assets (MVA)	1,865,900	1,736,369
f. Return on MVA (prior year)	14.4 %	6.8 %
g. Return on AVA (prior year)	9.1 %	8.0 %

¹ Contribution rate applicable for the plan year following the year of valuation.

Section 1 - Actuarial Funding Results

Section 1.1

Actuarial Liabilities and Normal Cost

Actuarial Accrued Liability	January 1, 2018	January 1, 2017
1. Active Members		
a. Retirement Benefits	1,012,883,863	980,320,341
b. Withdrawal Benefits	23,821,883	23,371,201
c. Disability Benefits	36,019,692	35,566,344
d. Death Benefits	16,028,511	15,363,864
Total	1,088,753,949	1,054,621,750
2. Inactive Members with Deferred Benefits	16,276,524	15,363,654
3. Retired Members and Beneficiaries Receiving Benefits	2,318,187,954	2,268,655,909
4. Total Actuarial Accrued Liability (1. + 2. + 3.)	3,423,218,427	3,338,641,313

Normal Cost	January 1, 2018	January 1, 2017
1. Active Members		
a. Retirement Benefits	55,642,091	53,827,419
b. Withdrawal Benefits	2,978,101	2,741,907
c. Disability Benefits	3,090,048	2,994,986
d. Death Benefits	1,215,528	1,147,252
2. Normal Cost (Dollar amount)	62,925,768	60,711,564
3. Total Normal Cost (As a % of pay)	10.57%	10.55%

Section 1.2

Actuarial (Gain) / Loss

Development of Actuarial (Gain) / Loss	Amount
1. Expected Actuarial Accrued Liability	
a. Actuarial Accrued Liability at January 1, 2017	3,338,641,313
b. Normal Cost at January 1, 2017	60,711,565
c. Interest on a. + b. to End of Year	280,446,612
d. Benefit Payments for 2017, with Interest to End of Year	<u>287,664,282</u>
e. Expected Actuarial Accrued Liability Before Changes (a. + b. + c. - d.)	3,392,135,208
f. Change in Actuarial Accrued Liability at January 1, 2018 due to Change in Actuarial Assumptions	0
g. Change in Actuarial Accrued Liability at January 1, 2018 due to Change in Plan Provisions	0
h. Expected Actuarial Accrued Liability at January 1, 2018 (e. + f. + g.)	3,392,135,208
2. Actuarial Accrued Liability at January 1, 2018	3,423,218,426
3. Liability (Gain) / Loss (2. - 1.h.)	31,083,218
4. Expected Actuarial Value of Assets	
a. Actuarial Value of Assets at January 1, 2017	1,752,472,572
b. Interest on a. to End of Year	144,578,988
c. Contributions Made for 2017	174,808,784
d. Interest on c. to End of Year	7,067,974
e. Benefit Payments and Administrative Expenses for 2017, with Interest to End of Year	290,298,130
f. Expected Actuarial Value of Assets at January 1, 2018 (a. + b. + c. + d. - e.)	1,788,630,188
5. Actuarial Value of Assets as of January 1, 2018	1,802,216,284
6. Actuarial Value Asset (Gain) / Loss (4.f. - 5.)	(13,586,096)
7. Total Actuarial (Gain) / Loss (3. + 6.)	17,497,122

Section 1.3

Actuarial Balance Sheet

Financial Resources	January 1, 2018	January 1, 2017
1. Actuarial Value of Assets	1,802,216,284	1,752,472,572
2. Present Value of Future Contributions	523,363,689	493,194,512
3. Unfunded Actuarial Accrued Liability/(Reserve)	<u>1,621,002,142</u>	<u>1,602,272,136</u>
4. Total Assets (1 + 2 + 3)	3,946,582,115	3,847,939,220
Benefit Obligations	January 1, 2018	January 1, 2017
1. Present Value of Future Benefits		
a. Active Members	1,612,117,637	1,563,919,657
b. Inactive Members	16,276,524	15,363,654
c. Retirees, disabilities and beneficiaries	<u>2,318,187,954</u>	<u>2,268,655,909</u>
d. Total	3,946,582,115	3,847,939,220

Section 1.4

Analysis of Financial Experience

Analysis of Actuarial (Gains) and Losses Resulting from Differences Between Assumed Experience and Actual Experience

Type of (Gain) or Loss	Year End December 31, 2017	As a % of Last Year's AAL
(1) COLA Experience	0	0.00%
(2) Salary Experience	11,563	0.00%
(3) Retiree Mortality Experience	(11,961,824)	-0.36%
(4) Other (turnover, retirement ages, service purchase, etc.)		
(a) Unexpected Participant Pick Up	28,931,027	0.87%
(b) Unexpected Data Change for Decrementing Actives	7,241,938	0.22%
(c) Unexpected Data Change for Continuing Actives	3,179,937	0.10%
(d) Unexpected Data Change for Continuing Inactives	195,838	0.01%
(e) Unexpected Rehires	(536,741)	-0.02%
(f) Miscellaneous	<u>(704,665)</u>	-0.02%
(g) Total	38,307,334	1.15%
(5) Active Decrements	1,587,326	0.05%
(6) New Entrants	3,138,819	0.09%
(7) Liability (Gain) or Loss During Year, (1) + (2) + (3) + (4)(g) + (5) + (6)	31,083,218	
(8) Investment Experience	(13,586,096)	-0.41%
(8) Asset Valuation Method	0	0.00%
(10) Assumption and Method Changes	0	0.00%
(11) Benefit Changes	0	0.00%
(12) Other	0	0.00%
(13) Total (Gain) or Loss During Year, (7) + (8) + (9) + (10) + (11) + (12)	17,497,122	0.52%

Section 1.5
History of UAAL and Funded Ratio
(\$'s in 000's)

Valuation Date	Actuarial Accrued Liability (AAL)	Actuarial Value of Assets (AVA)	Funded Ratio (AVA as a % of AAL)	Unfunded Actuarial Accrued Liability (UAAL)
January 1, 2018	3,423,218	1,802,216	52.65%	1,621,002
January 1, 2017	3,338,641	1,752,473	52.49%	1,586,168
January 1, 2016 *	3,267,121	1,743,216	53.36%	1,523,904
January 1, 2015 *	3,186,187	1,855,912	58.25%	1,330,275
January 1, 2014 *	3,105,567	1,892,714	60.95%	1,212,853
January 1, 2013 *	2,867,335	1,702,788	59.39%	1,164,547
January 1, 2012 *	2,808,184	1,662,196	59.19%	1,145,988
January 1, 2011	2,724,191	1,909,967	70.11%	814,224
January 1, 2010	2,588,462	1,936,849	74.83%	651,613
January 1, 2009	2,632,356	1,995,953	75.82%	636,403
January 1, 2008	2,531,440	941,864	37.21%	1,589,576

* Actuarial Value of Assets is Fair Market Value

Section 1.6 Solvency Test

Comparative Summary of Accrued Liability and Actuarial Value of Assets

Valuation as of January 1	Accrued Liability for:			Actuarial Value of Assets ¹	Portion of Accrued Liability Covered by Actuarial Value of Assets		
	(1) Active Member Contributions	(2) Retirees, Beneficiaries, TVRs and Disabled	(3) Active Member (Employer Financed Portion)		(1)	(2)	(3)
2018	496,944,601	2,334,464,478	591,809,348	1,802,216,284	100.00 %	55.91 %	0.00 %
2017	449,593,044	2,284,019,564	605,028,706	1,752,472,572	100.00 %	57.04 %	0.00 %
2016 ²	417,390,393	2,216,132,003	633,598,241	1,743,216,432	100.00 %	59.83 %	0.00 %
2015 ²	379,907,286	2,166,525,560	639,753,826	1,855,912,051	100.00 %	68.13 %	0.00 %
2014 ²	342,529,743	2,108,016,547	655,020,539	1,892,714,102	100.00 %	73.54 %	0.00 %

¹ Excludes health care assets.

² Actuarial Value of Assets is Fair Market Value

Section 1.7

Projected Actuarial Results

Projection of Funded Status based on Board Approved Contribution Rates

Year	Board Adopted Contribution Rates			Board Adopted Contributions					
	Employee Contribution Percent	Employer Contribution Percent	Total Percent	Employee Contribution	Employer Contribution	Total Contribution	Actuarial Accrued Liability	Actuarial Value of Assets	Funded Ratio
2018	12.010%	18.019%	30.029%	71,383,859	107,104,573	178,488,432	3,423,218,426	1,802,216,285	52.65%
2019	12.010%	18.019%	30.029%	73,757,984	110,666,718	184,424,702	3,483,013,955	1,866,035,765	53.58%
2020	12.010%	18.019%	30.029%	76,275,924	114,444,643	190,720,567	3,543,415,802	1,932,834,995	54.55%
2021	12.010%	18.019%	30.029%	79,100,966	118,683,345	197,784,311	3,602,686,952	2,002,702,010	55.59%
2022	12.010%	18.019%	30.029%	82,558,586	123,871,170	206,429,756	3,660,769,835	2,080,665,185	56.84%
2023	12.010%	18.019%	30.029%	86,239,416	129,393,899	215,633,315	3,717,934,196	2,145,991,505	57.72%
2024	12.010%	18.019%	30.029%	90,036,687	135,091,337	225,128,024	3,774,889,597	2,219,381,836	58.79%
2025	12.010%	18.019%	30.029%	93,977,079	141,003,514	234,980,593	3,831,605,555	2,301,602,589	60.07%
2026	12.010%	18.019%	30.029%	98,028,280	147,081,948	245,110,228	3,887,759,307	2,393,397,663	61.56%
2027	12.010%	18.019%	30.029%	102,271,879	153,449,058	255,720,937	3,942,897,096	2,495,517,376	63.29%
2028	12.010%	18.019%	30.029%	106,846,191	160,312,370	267,158,561	3,996,431,009	2,608,878,506	65.28%
2029	12.010%	18.019%	30.029%	111,652,420	167,523,652	279,176,072	4,049,428,738	2,736,451,059	67.58%
2030	12.010%	18.019%	30.029%	116,709,914	175,111,932	291,821,846	4,102,641,559	2,880,632,762	70.21%
2031	12.010%	18.019%	30.029%	121,970,957	183,005,619	304,976,576	4,157,677,611	3,044,316,855	73.22%
2032	12.010%	18.019%	30.029%	127,421,509	191,183,644	318,605,153	4,216,439,218	3,231,000,739	76.63%
2033	12.010%	18.019%	30.029%	132,949,066	199,477,208	332,426,274	4,280,403,568	3,443,794,125	80.45%
2034	12.010%	18.019%	30.029%	138,635,665	208,009,401	346,645,066	4,350,823,427	3,685,462,365	84.71%
2035	12.010%	18.019%	30.029%	144,536,657	216,863,267	361,399,924	4,429,531,370	3,959,685,049	89.39%
2036	12.010%	18.019%	30.029%	150,644,567	226,027,596	376,672,163	4,519,094,776	4,270,911,072	94.51%
2037	12.010%	18.019%	30.029%	156,710,795	235,129,384	391,840,179	4,621,036,236	4,623,125,157	100.05%
2038	12.010%	18.019%	30.029%	162,855,225	244,348,507	407,203,732	4,736,488,874	5,019,203,772	105.97%
2039	12.010%	18.019%	30.029%	169,065,286	253,666,103	422,731,389	4,866,526,924	5,462,713,350	112.25%
2040	12.010%	18.019%	30.029%	175,116,030	262,744,659	437,860,689	5,010,649,383	5,956,315,854	118.87%

Section 2 - Plan Assets

Section 2.1

Statement of Net Plan Assets

(\$'s in 000's)

	As of December 31	
	2017	2016
ASSETS		
1. Total investments, at fair value	1,849,264	1,725,220
2. Invested securities lending cash collateral	122,896	125,958
3. Receivables:		
a. Employer contributions	8,349	14,318
b. Employee contributions	5,645	10,198
c. Securities sold, but not received	8,400	18,241
d. Accrued interest and dividends	1,977	1,912
e. Other	<u>772</u>	<u>1,260</u>
4. Total assets	1,997,303	1,897,107
LIABILITIES		
1. Payable upon return of securities	122,896	125,958
2. Accounts payable	3,383	3,496
3. Other payables	108	109
4. Securities purchased, but not paid	<u>5,016</u>	<u>31,175</u>
5. Total liabilities	131,403	160,738
Net assets held in trust for Plan benefits	1,865,900	1,736,369

Section 2.2
Changes in Net Plan Assets
(\$'s in 000's)

	As of December 31	
	2017	2016
ADDITIONS		
1. Net investment (loss) income	\$ 233,738	\$ 118,614
2. Employer contributions	104,523	83,855
3. Employee contributions	70,286	59,560
4. Other income	-	-
Total additions	\$ 408,547	\$ 262,029
DEDUCTIONS		
1. Benefit payments	\$ 269,141	\$ 261,727
2. Contribution refunds, including interest	7,344	4,840
3. Administrative expenses	2,531	2,309
Total liabilities	\$ 279,016	\$ 268,876
NET ASSETS HELD IN TRUST FOR PLAN BENEFITS		
1. Beginning of year	\$ 1,736,369	\$ 1,743,216
2. Net (decrease) increase	129,531	(6,847)
End of year	\$ 1,865,900	\$ 1,736,369

Section 2.3

Actuarial Value of Assets

Development of Actuarial Value of Assets		8.25%	Amount
1. Actuarial Value of Assets as of January 1, 2017			\$ 1,752,472,572
2. Unrecognized Return as of January 1, 2017			(16,103,394)
3. Fair Value of Assets as of January 1, 2017			\$ 1,736,369,178
4. Contributions			
a. Member (includes purchased service)			\$ 70,285,731
b. Employer			104,523,053
c. Miscellaneous contributions			-
d. Total			\$ 174,808,784
5. Distributions			
a. Benefit payments			\$ 269,140,863
b. Refund of contributions			7,344,400
c. Administrative expenses			2,531,493
d. Total			\$ 279,016,756
6. Expected Return at 8.25% on			
a. Item 1.			\$ 144,578,987
b. Item 2.			(1,328,530)
c. Item 4.d.			7,067,974
d. Item 5.d.			11,281,374
e. Total [a. + b. + c. - d.]			\$ 139,037,057
7. Actual Return on Fair Value for Fiscal Year, Net of Investment Expenses			\$ 233,739,434
8. Return to be Spread for Fiscal Year (7. - 6.e) *			\$ 94,702,377
9. Total Fair Value of Assets as of January 1, 2018			\$ 1,865,900,641
10. Return to be Spread			
Fiscal Year	Return to be Spread	Unrecognized Percent	Unrecognized Return
2017	\$ 94,702,377	80%	\$ 75,761,902
2016	(20,129,242)	60%	(12,077,545)
2015		40%	-
2014		20%	-
2013		0%	-
		Total	\$ 63,684,357
11. Actuarial Value of Assets as of January 1, 2018 (9. - 10.)			\$ 1,802,216,284
12. Recognized Rate of Return for the Year on Actuarial Value of Assets			9.1%
13. Rate of Return for the Year on Fair Value of Assets (reported by investment consultant - net of inv. exp.)			14.4%
* The Annual Return to be Spread calculation is based on an assumed 8.25% investment return which includes an assumption that all expenses and revenues are on average paid at mid-year			

Section 2.4
Historical Asset Rate of Return

Year Ending December 31	Fair Value Annual Recognized Rate of Return ¹	Actuarial Value Annual Recognized Rate of Return
2017	14.40%	9.10%
2016	6.80%	8.00%
2015	-0.20%	N/A
2014	4.80%	N/A
2013	19.50%	N/A

¹ As reported by the Plan.

Section 2.5

Forecast of Expected Benefit Payments

Year Ending December 31	Active Members	Inactive Members	Total Payments
2018	10,232,356	269,194,401	279,426,757
2019	24,100,997	262,202,384	286,303,381
2020	37,734,080	255,822,351	293,556,431
2021	51,641,891	249,086,522	300,728,413
2022	65,241,175	242,286,628	307,527,803
2023	78,386,603	235,169,477	313,556,080
2024	91,632,452	228,027,551	319,660,003
2025	105,322,488	220,647,674	325,970,162
2026	119,469,413	212,988,327	332,457,740
2027	134,133,976	205,089,800	339,223,776
2028	148,692,147	197,003,239	345,695,386
2029	162,694,853	188,787,963	351,482,816
2030	175,875,250	180,463,303	356,338,553
2031	187,737,815	172,030,134	359,767,949
2032	198,879,067	163,430,716	362,309,783
2033	209,572,250	154,743,789	364,316,039
2034	219,265,030	146,036,692	365,301,722
2035	227,461,019	137,398,985	364,860,004
2036	234,386,312	128,791,097	363,177,409
2037	240,381,146	120,243,433	360,624,579
2038	245,379,294	111,801,799	357,181,093
2039	249,258,114	103,489,912	352,748,026
2040	252,078,151	95,376,569	347,454,720
2041	253,924,076	87,502,365	341,426,441
2042	255,075,517	79,906,008	334,981,525
2043	255,457,523	72,619,727	328,077,250
2044	255,355,658	65,672,040	321,027,698
2045	254,778,649	59,092,914	313,871,563
2046	253,896,906	52,906,645	306,803,551
2047	252,599,389	47,126,506	299,725,895
2048	250,913,581	41,760,978	292,674,559
2049	248,642,731	36,810,034	285,452,765
2050	246,080,481	32,270,417	278,350,898
2051	242,961,777	28,133,271	271,095,048
2052	238,952,384	24,386,463	263,338,847
2053	233,978,618	21,016,021	254,994,639
2054	228,190,432	18,004,729	246,195,161
2055	221,661,531	15,331,124	236,992,655
2056	214,283,478	12,970,901	227,254,379
2057	206,285,315	10,901,384	217,186,699
2058	197,717,281	9,099,467	206,816,748
2059	188,771,764	7,542,464	196,314,228
2060	179,571,555	6,207,034	185,778,589
2061	170,184,314	5,070,355	175,254,669
2062	160,734,902	4,109,659	164,844,561
2063	151,289,180	3,305,027	154,594,207
2064	141,922,760	2,637,800	144,560,560
2065	132,692,575	2,089,764	134,782,339
2066	123,639,984	1,643,452	125,283,436
2067	114,811,247	1,283,314	116,094,561
2068	106,235,820	994,955	107,230,775
2069	97,948,206	766,078	98,714,284
2070	89,969,549	586,088	90,555,637

Section 2.5
Forecast of Expected Benefit Payments, continued

Year Ending December 31	Active Members	Inactive Members	Total Payments
2071	82,313,138	445,732	82,758,870
2072	74,982,107	337,257	75,319,364
2073	67,980,570	254,176	68,234,746
2074	61,314,166	191,074	61,505,240
2075	54,989,617	143,498	55,133,115
2076	49,012,107	107,965	49,120,072
2077	43,389,325	81,579	43,470,904
2078	38,131,298	62,102	38,193,400
2079	33,245,261	47,799	33,293,060
2080	28,740,632	37,283	28,777,915
2081	24,618,418	29,484	24,647,902
2082	20,878,387	23,642	20,902,029
2083	17,519,303	19,206	17,538,509
2084	14,538,216	15,768	14,553,984
2085	11,923,543	13,040	11,936,583
2086	9,659,613	10,813	9,670,426
2087	7,726,871	8,945	7,735,816
2088	6,101,411	7,345	6,108,756
2089	4,754,194	5,929	4,760,123
2090	3,654,858	4,668	3,659,526
2091	2,770,918	3,606	2,774,524
2092	2,071,207	2,731	2,073,938
2093	1,526,370	2,015	1,528,385
2094	1,108,353	1,450	1,109,803
2095	792,856	1,009	793,865
2096	558,536	681	559,217
2097	387,694	440	388,134
2098	265,219	276	265,495
2099	178,951	166	179,117
2100	119,158	99	119,257
2101	78,301	59	78,360
2102	50,816	35	50,851
2103	32,545	21	32,566
2104	20,595	13	20,608
2105	12,873	8	12,881
2106	7,927	5	7,932
2107	4,811	3	4,814
2108	2,878	2	2,880
2109	1,692	1	1,693
2110	968	1	969
2111	536	0	536
2112	289	0	289
2113	151	0	151
2114	78	0	78
2115	39	0	39

Note: Forecast based on the present members without assumption about replacement members

Section 3 - Accounting Information

Section 3.1

Actuarial Methods and Assumptions for GASB 67/68 Disclosure Purposes

The total pension liability as of December 31, 2017 was determined by rolling forward the total pension liability as of January 1, 2017 to December 31, 2017 using the following actuarial methods and assumptions, applied to all periods included in the measurement. All other assumptions such as retirement rates, termination rates, and disability rates used to determine the total pension liability are set forth in Section 6 - Basis of the Actuarial Valuation.

Valuation Date: January 1, 2017

Actuarial Cost Method: Entry Age Normal – Level Percentage of Pay

Amortization Method: For pension expense; the difference between expected and actual liability experience and changes of assumptions are amortized over the average of the expected remaining service lives of all members. The difference between projected and actual earnings is amortized over a closed period of five years.

Mortality: *Healthy pensioners:* RP2000 Blue Collar Table, with full generational projection from 2000 using Scale BB
Disabled pensioners: RP2000 Disabled Lives Table, with full generational projection from 2000 using Scale BB.
Active members: RP2000 Blue Collar Table, with full generational projection from 2000 using Scale BB.

Experience Study: The actuarial assumptions used were based on the results of an actuarial experience study for the period January 1, 2008 through December 31, 2012.

Section 3.2

Schedule of Expected Changes in Net Pension Liability as of December 31, 2017

The GASB Statement No. 67 Change in Net Pension Liability

Schedule of Changes in Net Pension Liability		
Fiscal Year Ending	Dec. 31, 2017	Dec. 31, 2016
Total Pension Liability		
Service Cost	\$ 50,432,791	\$ 50,111,555
Interest	278,183,536	269,898,773
Changes of Benefit Terms	-	-
Difference between Expected and Actual Experience	13,679,323	51,517,655
Change of Assumptions	-	-
Benefit Payments, including Refund of Member Contributions	(276,485,263)	(266,566,974)
Net Change in Total Pension Liability	65,810,387	104,961,009
Total Pension Liability - Beginning of Year	\$ 3,456,992,119	\$ 3,352,031,110
Total Pension Liability - End of Year	\$ 3,522,802,506	\$ 3,456,992,119
Plan Fiduciary Net Position		
Employer Contributions	\$ 104,523,053	\$ 83,855,066
Member Contributions	70,285,731	59,560,473
Net Investment Income	233,739,435	118,613,412
Benefit Payments, including Refund of Member Contributions	(276,485,263)	(266,566,974)
Administrative Expenses	(2,531,493)	(2,309,231)
Other	-	-
Net Change in Plan Fiduciary Net Position	129,531,463	(6,847,254)
Plan Fiduciary Net Position - Beginning of Year	\$ 1,736,369,178	\$ 1,743,216,432
Plan Fiduciary Net Position - End of Year	\$ 1,865,900,641	\$ 1,736,369,178

Section 3.3

Net Pension Liability (Asset)

The GASB Statement No. 67 Net Pension Liability

Net Pension Liability (Asset)		
Valuation Date	Dec. 31, 2017	Dec. 31, 2016
Total Pension Liability	\$ 3,522,802,506	\$ 3,456,992,119
Plan Fiduciary Net Position	<u>1,865,900,641</u>	<u>1,736,369,178</u>
Net Pension Liability (Asset)	\$ 1,656,901,865	\$ 1,720,622,941
Plan Fiduciary Net Position as a Percentage of the Total Pension Liability (Asset)	52.97%	50.23%

Section 3.4

Sensitivity

The GASB Statement No. 67 Sensitivity of Net Pension Liability

Sensitivity of the Net Pension Liability to Changes in the Discount Rate			
December 31, 2017	1% Decrease	Current	1% Increase
Discount Rate	7.25%	8.25%	9.25%
Net Pension Liability (Asset)	\$ 1,997,031,156	\$ 1,656,901,865	\$ 1,365,529,307

The discount rate used to measure the total pension liability was 8.25%. The projection of cash flows used to determine the discount rate assumed that the System's contributions will continue to follow the current funding policy. Based on those assumptions, the System's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members.

Section 3.5

Pension Expense

The GASB Statement No. 68 Pension Expense

Pension Expense		
Measurement Year Ending	Dec. 31, 2017	Dec. 31, 2016
Service Cost	\$ 50,432,791	\$ 50,111,555
Interest	278,183,536	269,898,773
Difference between Expected and Actual Experience	17,463,073	14,368,203
Change of Assumptions	-	-
Member Contributions	(70,285,731)	(59,560,473)
Projected Earnings on Plan Investments	(139,037,058)	(138,742,654)
Difference between Expected and Actual Earnings	29,115,320	48,055,795
Administrative Expense	2,531,493	2,309,231
Other	-	-
Changes of Benefit Terms	-	-
Total Pension Expense	<u>168,403,424</u>	<u>186,440,430</u>

Section 3.6

Supporting Exhibits

Schedule of Deferred Inflows and Outflows

Amortization of the Difference Between Expected and Actual Experience									
Measurement Date	2014	2015	2016	2017	2018	2019	Outflows	Inflows	Total
Amount Established	\$ -	\$ 13,082,408	\$ 51,517,655	\$ 13,679,323					
Recognition Period	-	4.52	4.49	4.42					
Amount Recognized in FY									
2014	\$ -						\$ -	\$ -	\$ -
2015	-	\$ 2,894,338					2,894,338	-	2,894,338
2016	-	2,894,338	\$ 11,473,865				14,368,203	-	14,368,203
2017	-	2,894,338	11,473,865	\$ 3,094,869			17,463,073	-	17,463,073
2018	-	2,894,338	11,473,865	3,094,869			17,463,073	-	17,463,073
2019	-	1,505,056	11,473,865	3,094,869			16,073,791	-	16,073,791
2020	-	-	5,622,194	3,094,869			8,717,063	-	8,717,063
2021	-	-	-	1,299,845			1,299,845	-	1,299,845
Deferred Balance at 12/31									
2014	\$ -						\$ -	\$ -	\$ -
2015	-	\$ 10,188,070					10,188,070	-	10,188,070
2016	-	7,293,732	\$ 40,043,790				47,337,522	-	47,337,522
2017	-	4,399,394	28,569,924	\$ 10,584,454			43,553,772	-	43,553,772
2018	-	1,505,056	17,096,059	7,489,584			26,090,699	-	26,090,699
2019	-	-	5,622,194	4,394,715			10,016,909	-	10,016,909
2020	-	-	-	1,299,845			1,299,845	-	1,299,845
2021	-	-	-	-			-	-	-
Amortization of Changes in Assumptions									
Measurement Date	2014	2015	2016	2017	2018	2019	Outflows	Inflows	Total
Amount Established	\$ -	\$ -	\$ -	\$ -					
Recognition Period	-	-	-	-					
Amount Recognized in FY									
2014	\$ -						\$ -	\$ -	\$ -
2015	-	\$ -					-	-	-
2016	-	-	\$ -				-	-	-
2017	-	-	-	\$ -			-	-	-
2018	-	-	-	-			-	-	-
2019	-	-	-	-			-	-	-
2020	-	-	-	-			-	-	-
2021	-	-	-	-			-	-	-
Deferred Balance at 12/31									
2014	\$ -						\$ -	\$ -	\$ -
2015	-	\$ -					-	-	-
2016	-	-	\$ -				-	-	-
2017	-	-	-	\$ -			-	-	-
2018	-	-	-	-			-	-	-
2019	-	-	-	-			-	-	-
2020	-	-	-	-			-	-	-
2021	-	-	-	-			-	-	-
Amortization of the Difference Between Projected and Actual Earnings									
Measurement Date	2014	2015	2016	2017	2018	2019	Outflows	Inflows	Total
Amount Established	\$ 80,156,326	\$ 139,993,404	\$ 20,129,242	\$ (94,702,377)					
Recognition Period	5.00	5.00	5.00	5.00					
Amount Recognized in FY									
2014	\$ 16,031,265						\$ 16,031,265	\$ -	\$ 16,031,265
2015	16,031,265	\$ 27,998,681					44,029,946	-	44,029,946
2016	16,031,265	27,998,681	\$ 4,025,849				48,055,795	-	48,055,795
2017	16,031,265	27,998,681	4,025,849	\$ (18,940,475)			48,055,795	(18,940,475)	29,115,320
2018	16,031,265	27,998,681	4,025,849	(18,940,475)			48,055,795	(18,940,475)	29,115,320
2019	-	27,998,681	4,025,849	(18,940,475)			32,024,530	(18,940,475)	13,084,054
2020	-	-	4,025,846	(18,940,475)			4,025,846	(18,940,475)	(14,914,629)
2021	-	-	-	(18,940,475)			-	(18,940,475)	(18,940,475)
Deferred Balance at 12/31									
2014	\$ 64,125,061						\$ 64,125,061	\$ -	\$ 64,125,061
2015	48,093,796	\$ 111,994,723					160,088,519	-	160,088,519
2016	32,062,530	83,996,042	\$ 16,103,393				132,161,966	-	132,161,966
2017	16,031,265	55,997,362	12,077,544	\$ (75,761,902)			84,106,171	(75,761,902)	8,344,269
2018	-	27,998,681	8,051,695	(56,821,426)			36,050,376	(56,821,426)	(20,771,050)
2019	-	-	4,025,846	(37,880,951)			4,025,846	(37,880,951)	(33,855,104)
2020	-	-	-	(18,940,475)			-	(18,940,475)	(18,940,475)
2021	-	-	-	-			-	-	-

Section 3.6

Supporting Exhibits, continued

Schedule of CTA Contributions

	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007
Employer Portion of Required Contribution on a statutory basis	\$ 106,662	\$ 82,001	\$ 81,731	\$ 80,488	\$ 102,800	\$ 61,982	\$ 55,976	\$ 56,474	\$ 34,030	\$ 53,473	\$ 51,418
Actual Employer Contributions	\$ 104,523	\$ 83,855	\$ 82,800	\$ 82,268	\$ 79,518	\$ 62,788	\$ 60,318	\$ 56,216	\$ 41,448	\$ 1,165,947	\$ 25,038
Contribution deficiency (excess)	\$ 2,139	\$ (1,854)	\$ (1,069)	\$ (1,780)	\$ 23,282	\$ (806)	\$ (4,342)	\$ 258	\$ (7,418)	\$ (1,112,474)	\$ 26,380
Covered-employee payroll	\$ 595,047	\$ 575,444	\$ 573,548	\$ 564,827	\$ 550,616	\$ 548,515	\$ 541,354	\$ 528,288	\$ 567,173	\$ 594,139	\$ 571,314
Contributions as a percentage of covered-employee payroll	17.93%	14.25%	14.25%	14.25%	18.67%	11.30%	10.34%	10.69%	6.00%	9.00%	9.00%

Notes to Schedule -

Valuation Date: Actuarially determined contribution rates are calculated as of January 1, one year prior to the end of the fiscal year in which contributions are reported

Methods and assumptions used to determine the 2017 contribution rates:

Actuarial Cost Method	Entry Age Normal
Amortization Method	Level, open
Remaining amortization period	20 years with 2% escalator
Asset valuation method	Market
Inflation	3.25%
Salary increases	5 year select and ultimate at 4.00%, including inflation
Investment rate of return	8.25%, net of pension plan investment expenses, including inflation
Retirement Age	Normal retirement age is 65. Participants may retire earlier if they meet certain age/service requirements
Mortality	RP2000 Blue Collar Table, with full generational projection from 2000 using Scale BB

Other information:

Beginning in 2015, the Actuarial cost method was changed from Projected Unit Credit to Entry Age Normal; the Amortization period was changed to 20 years with a 2% escalator from 30 years with no escalator.

The demographic assumptions were updated in 2014 to bring the assumptions more in line with actual plan experience.

Section 3.6

Supporting Exhibits, continued

Projection of Fiduciary Net Position

Year	Projected Beginning Fiduciary Net Position (a)	Projected Total Contributions (b)	Projected Benefit Payments (c)	Projected Administrative Expense (d)	Projected Investment Earnings (e)	Projected Ending Fiduciary Net Position (f) = (a) + (b) - (c) - (d) + (e)
12/31/2017	1,865,900,641	177,841,598	279,438,700	2,400,000	149,731,929	1,911,635,468
12/31/2018	1,911,635,468	180,906,015	286,314,845	2,448,000	153,348,994	1,957,127,632
12/31/2019	1,957,127,632	183,478,477	293,567,804	2,496,960	156,910,873	2,001,452,218
12/31/2020	2,001,452,218	186,330,045	300,739,775	2,546,899	160,390,947	2,044,886,536
12/31/2021	2,044,886,536	190,165,859	307,538,702	2,597,837	163,852,412	2,088,768,268
12/31/2022	2,088,768,268	194,423,023	313,567,390	2,649,794	167,398,927	2,134,373,034
12/31/2023	2,134,373,034	198,711,981	319,671,988	2,702,790	171,085,767	2,181,796,004
12/31/2024	2,181,796,004	202,979,008	325,982,601	2,756,846	174,913,348	2,230,948,914
12/31/2025	2,230,948,914	207,257,840	332,470,675	2,811,983	178,876,909	2,281,801,005
12/31/2026	2,281,801,005	211,531,852	339,236,745	2,868,222	182,969,172	2,334,197,061
12/31/2027	2,334,197,061	216,800,395	345,707,078	2,925,587	187,240,936	2,389,605,727
12/31/2028	2,389,605,727	222,706,609	351,494,259	2,984,098	191,814,598	2,449,648,576
12/31/2029	2,449,648,576	229,046,241	356,349,553	3,043,780	196,825,736	2,516,127,219
12/31/2030	2,516,127,219	236,042,847	359,778,339	3,104,656	202,452,018	2,591,739,089
12/31/2031	2,591,739,089	243,587,463	362,320,344	3,166,749	208,889,755	2,678,729,214
12/31/2032	2,678,729,214	251,223,174	364,326,152	3,230,084	216,291,511	2,778,687,663
12/31/2033	2,778,687,663	259,326,641	365,311,324	3,294,686	224,823,282	2,894,231,577
12/31/2034	2,894,231,577	268,081,045	364,869,084	3,360,579	234,724,836	3,028,807,794
12/31/2035	3,028,807,794	277,566,181	363,186,516	3,427,791	246,276,196	3,186,035,864
12/31/2036	3,186,035,864	287,224,066	360,633,649	3,496,347	259,738,452	3,368,868,386
12/31/2037	3,368,868,386	297,215,182	357,190,368	3,566,274	275,362,495	3,580,689,422
12/31/2038	3,580,689,422	307,694,357	352,757,312	3,637,599	293,437,787	3,825,426,655
12/31/2039	3,825,426,655	318,235,932	347,466,161	3,710,351	314,265,826	4,106,751,901
12/31/2040	4,106,751,901	329,270,939	341,440,894	3,784,558	338,161,950	4,428,959,338
12/31/2041	4,428,959,338	340,834,949	334,998,566	3,860,249	365,469,046	4,796,404,518
12/31/2042	4,796,404,518	352,843,686	328,100,835	3,937,454	396,544,589	5,213,754,504
12/31/2043	5,213,754,504	365,332,245	321,056,472	4,016,203	431,762,546	5,685,776,619
12/31/2044	5,685,776,619	378,138,106	313,901,512	4,096,528	471,508,190	6,217,424,876
12/31/2045	6,217,424,876	391,290,500	306,834,255	4,178,458	516,183,392	6,813,886,055
12/31/2046	6,813,886,055	404,510,036	299,757,235	4,262,027	566,208,703	7,480,585,531
12/31/2047	7,480,585,531	418,058,349	292,706,388	4,347,268	622,040,841	8,223,631,065
12/31/2048	8,223,631,065	431,919,800	285,484,674	4,434,213	684,191,029	9,049,823,007
12/31/2049	9,049,823,007	445,643,685	278,382,920	4,522,897	753,190,313	9,965,751,188
12/31/2050	9,965,751,188	459,867,466	271,126,764	4,613,355	829,619,221	10,979,497,755
12/31/2051	10,979,497,755	474,629,760	263,370,046	4,705,622	914,160,084	12,100,211,931
12/31/2052	12,100,211,931	490,070,319	255,025,452	4,799,735	1,007,576,894	13,338,033,957
12/31/2053	13,338,033,957	506,196,879	246,225,186	4,895,730	1,110,701,187	14,703,811,107

*The contributions displayed contain both employer and employee contributions

Section 3.6

Supporting Exhibits, continued

Actuarial Present Value of Projected Benefit Payments

Year	Projected Beginning Fiduciary Net Position	Projected Benefit Payments	Funded Portion of		8.25%	3.16%	8.25%
			Projected Benefit Payments	Unfunded Portion of Projected Benefit Payments	Present Value of Funded Benefit Payments	Present Value of Unfunded Benefit Payments	Present Value of Benefit Payments Using Single Discount Rate
12/31/2017	1,865,900,641	279,438,700	279,438,700	-	258,141,986	-	258,141,986
12/31/2018	1,911,635,468	286,314,845	286,314,845	-	244,336,335	-	244,336,335
12/31/2019	1,957,127,632	293,567,804	293,567,804	-	231,432,693	-	231,432,693
12/31/2020	2,001,452,218	300,739,775	300,739,775	-	219,017,718	-	219,017,718
12/31/2021	2,044,886,536	307,538,702	307,538,702	-	206,899,886	-	206,899,886
12/31/2022	2,088,768,268	313,567,390	313,567,390	-	194,878,290	-	194,878,290
12/31/2023	2,134,373,034	319,671,988	319,671,988	-	183,530,922	-	183,530,922
12/31/2024	2,181,796,004	325,982,601	325,982,601	-	172,890,520	-	172,890,520
12/31/2025	2,230,948,914	332,470,675	332,470,675	-	162,892,917	-	162,892,917
12/31/2026	2,281,801,005	339,236,745	339,236,745	-	153,540,813	-	153,540,813
12/31/2027	2,334,197,061	345,707,078	345,707,078	-	144,544,415	-	144,544,415
12/31/2028	2,389,605,727	351,494,259	351,494,259	-	135,763,609	-	135,763,609
12/31/2029	2,449,648,576	356,349,553	356,349,553	-	127,149,148	-	127,149,148
12/31/2030	2,516,127,219	359,778,339	359,778,339	-	118,588,982	-	118,588,982
12/31/2031	2,591,739,089	362,320,344	362,320,344	-	110,325,053	-	110,325,053
12/31/2032	2,678,729,214	364,326,152	364,326,152	-	102,481,121	-	102,481,121
12/31/2033	2,778,687,663	365,311,324	365,311,324	-	94,926,780	-	94,926,780
12/31/2034	2,894,231,577	364,869,084	364,869,084	-	87,586,017	-	87,586,017
12/31/2035	3,028,807,794	363,186,516	363,186,516	-	80,537,755	-	80,537,755
12/31/2036	3,186,035,864	360,633,649	360,633,649	-	73,876,812	-	73,876,812
12/31/2037	3,368,868,386	357,190,368	357,190,368	-	67,594,869	-	67,594,869
12/31/2038	3,580,689,422	352,757,312	352,757,312	-	61,668,320	-	61,668,320
12/31/2039	3,825,426,655	347,466,161	347,466,161	-	56,113,932	-	56,113,932
12/31/2040	4,106,751,901	341,440,894	341,440,894	-	50,938,460	-	50,938,460
12/31/2041	4,428,959,338	334,998,566	334,998,566	-	46,168,453	-	46,168,453
12/31/2042	4,796,404,518	328,100,835	328,100,835	-	41,771,667	-	41,771,667
12/31/2043	5,213,754,504	321,056,472	321,056,472	-	37,759,653	-	37,759,653
12/31/2044	5,685,776,619	313,901,512	313,901,512	-	34,104,530	-	34,104,530
12/31/2045	6,217,424,876	306,834,255	306,834,255	-	30,796,020	-	30,796,020
12/31/2046	6,813,886,055	299,757,235	299,757,235	-	27,792,814	-	27,792,814
12/31/2047	7,480,585,531	292,706,388	292,706,388	-	25,070,740	-	25,070,740
12/31/2048	8,223,631,065	285,484,674	285,484,674	-	22,588,627	-	22,588,627
12/31/2049	9,049,823,007	278,382,920	278,382,920	-	20,348,000	-	20,348,000
12/31/2050	9,965,751,188	271,126,764	271,126,764	-	18,307,271	-	18,307,271
12/31/2051	10,979,497,755	263,370,046	263,370,046	-	16,428,189	-	16,428,189
12/31/2052	12,100,211,931	255,025,452	255,025,452	-	14,695,317	-	14,695,317
12/31/2053	13,338,033,957	246,225,186	246,225,186	-	13,106,900	-	13,106,900

Section 4 - Actuarial Funding Projections

Section 4.1

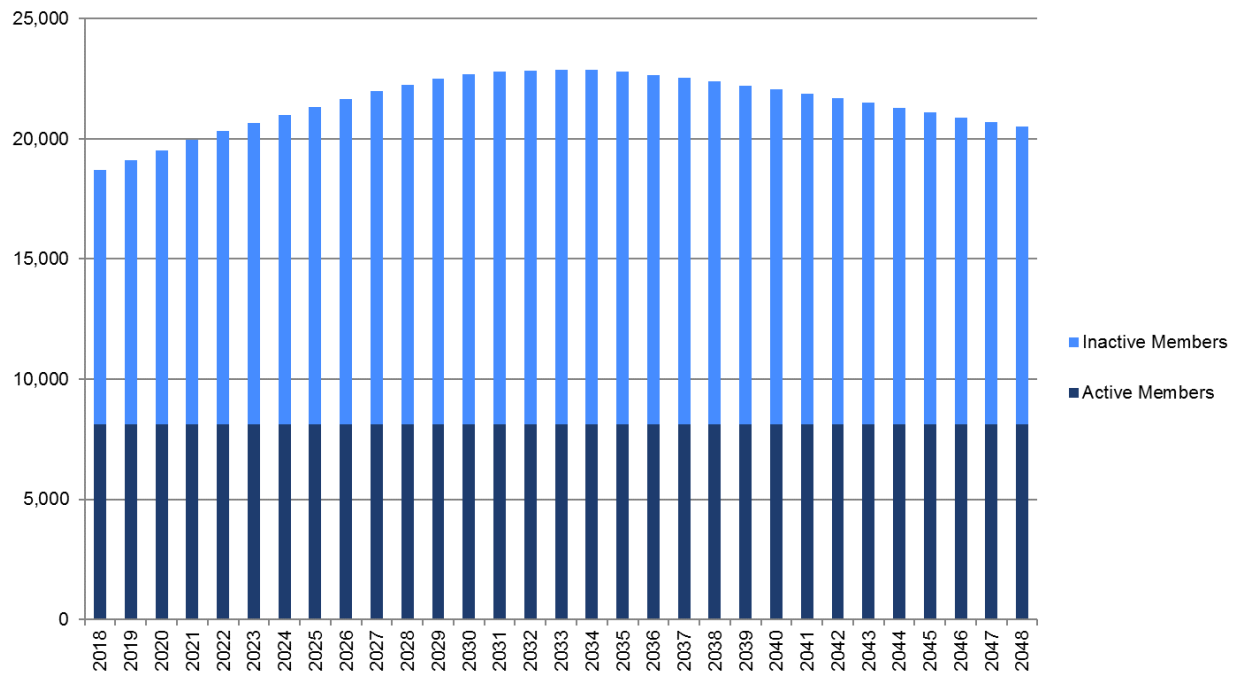
Projection Assumptions and Methods

Key Assumptions

- 8.25% investment return on the Fair Value of Assets in all future years.
- The Actuarial Value of Assets is based on a five-year smoothing method.
- Actuarial assumptions and methods as described in Section 6. All future demographic experience is assumed to be exactly realized.
- The actuarially calculated contribution is contributed each year.
- Projections assume a 0% increase in the total active member population. All new future members are expected to enter the plan after 12 months of continuous service and contribution rates are determined as a percent of total payroll.

Section 4.2 Membership Projection

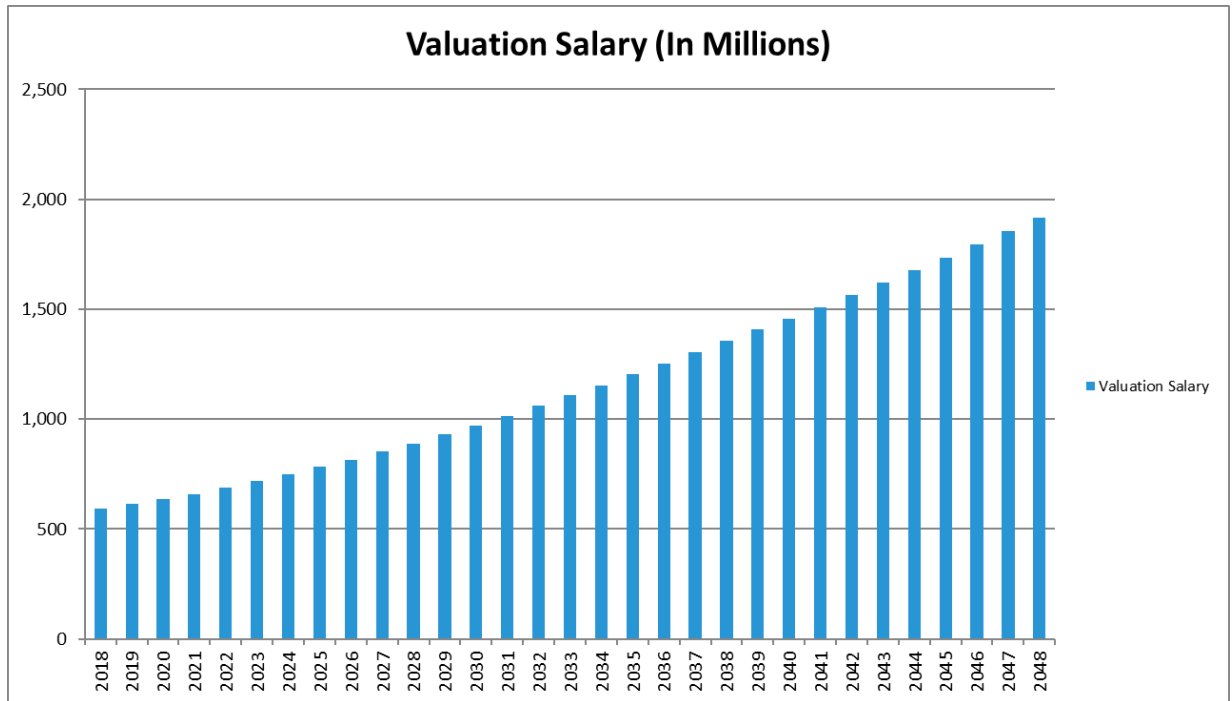
Projected Member Count



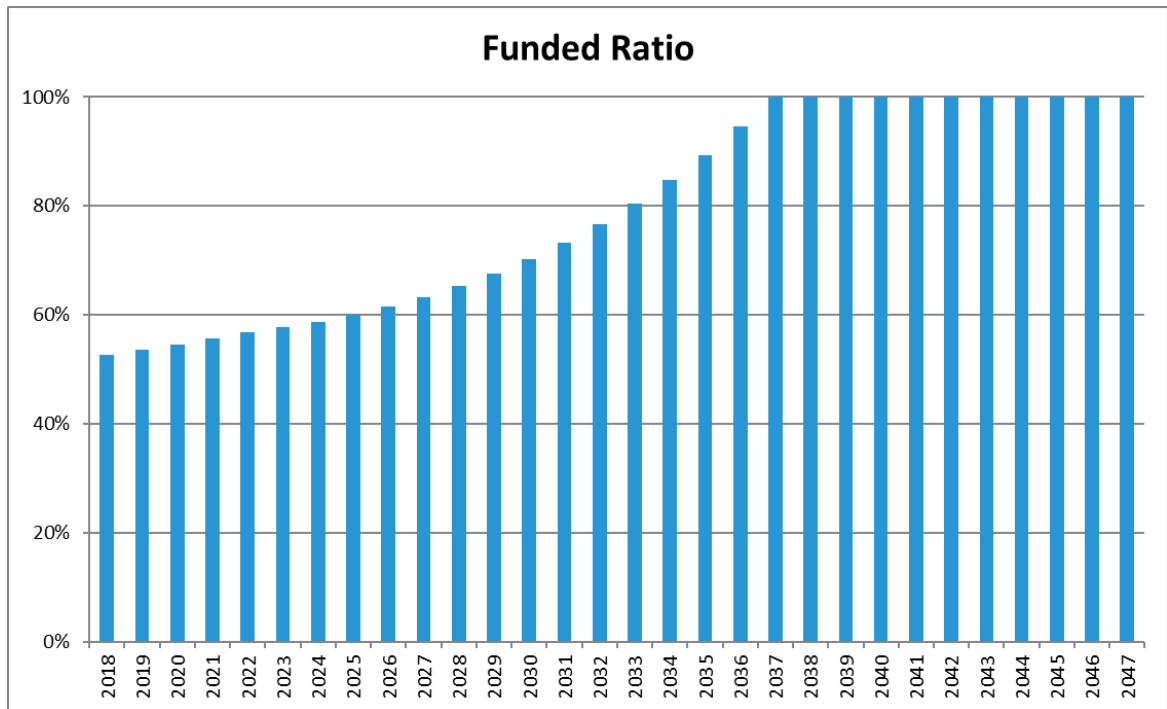
Section 4.2

Membership Projection, continued

Projected Current and New Member Payroll



Section 4.3 Projection of Funded Status



Section 5 - Member Data

Section 5.1

Summary of Membership Data as of January 1, 2018

(\$ in 000's)

Active Employees			
Item	Male	Female	Total
Number of Members ¹	5,741	2,451	8,192
Annual Salaries ²	\$439,037	\$156,010	\$595,047
Average Age ¹	48.86	47.71	48.51
Average Service ¹	13.78	12.40	13.36
Terminated Vested Employees			
Item	Male	Female	Total
Number of Members	75	31	106
Annual Accrued Benefit	\$2,036	\$826	\$2,862
Average Age	57.74	57.81	57.76
Retirees and Beneficiaries			
Item	Male	Female	Total
Number of Members	6,802	2,363	9,165
Annual Retirement Benefit	\$198,978	\$49,703	\$248,681
Average Age	71.41	71.84	71.52
Disability Allowances			
Item	Male	Female	Total
Number of Members	674	548	1,222
Annual Disability Benefit	\$12,562	\$8,583	\$21,145
Average Age	64.17	62.14	63.26

¹ Active statistics include all participants who are actively employed which includes 26 participants who are on leave and 77 participants who have opted out of participating in the Plan and are only entitled to a return of their contributions.

² The salary information for the 77 participants who have opted out of participating in the Plan is not included.

Section 5.2

Age and Service Distribution of Active Members as of January 1, 2018

Number of Participants

Age	Years of Service									Total
	Under 5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	Over 40	
Under 25	25	-	-	-	-	-	-	-	-	25
25-29	227	28	4	-	-	-	-	-	-	259
30-34	370	143	58	3	-	-	-	-	-	574
35-39	338	168	262	121	1	-	-	-	-	890
40-44	293	155	208	270	91	2	-	-	-	1,019
45-49	321	190	294	359	324	49	1	-	-	1,538
50-54	244	125	232	376	355	211	44	-	-	1,587
55-59	183	107	181	349	263	156	77	12	-	1,328
60-64	102	52	106	166	170	97	45	15	8	761
Over 65	17	22	36	55	29	26	9	7	10	211
Total	2,120	990	1,381	1,699	1,233	541	176	34	18	8,192

Section 5.3

Retirement Retiree and Beneficiary Data as of January 1, 2018

Number and Average Annual Allowance

Age Last Birthday	Number	Annual Allowance	Average Allowance
Retired Annuitants			
Under 50	30	\$1,374,204	\$45,807
50-54	210	\$8,913,372	\$42,445
55-59	487	\$19,647,627	\$40,344
60-64	1,064	\$39,171,451	\$36,815
65-69	1,848	\$56,531,434	\$30,591
70-74	2,019	\$56,461,585	\$27,965
75-79	1,299	\$32,517,458	\$25,033
Over 79	1075	\$20,764,024	\$19,315
Total	8,032	\$235,381,155	\$29,305
Surviving Spouses			
Under 50	9	\$97,001	\$10,778
50-54	10	\$130,278	\$13,028
55-59	59	\$755,034	\$12,797
60-64	104	\$1,489,668	\$14,324
65-69	184	\$2,659,252	\$14,452
70-74	228	\$2,856,707	\$12,529
75-79	171	\$1,962,895	\$11,479
Over 79	368	\$3,348,777	\$9,100
Total	1,133	\$13,299,612	\$11,738
Disability Allowances			
Under 50	137	\$2,304,023	\$16,818
50-54	136	\$2,725,147	\$20,038
55-59	202	\$4,149,761	\$20,543
60-64	200	\$3,886,817	\$19,434
65-69	210	\$3,423,283	\$16,301
70-74	181	\$2,668,046	\$14,741
75-79	88	\$1,130,257	\$12,844
Over 79	68	\$857,207	\$12,606
Total	1,222	\$21,144,541	\$17,303

Section 5.4

Inactive Vested Employee Data as of January 1, 2018

Number and Average Accrued Benefit

Age Last Birthday	Number	Annual Accrued Benefit	Average Accrued Benefit
Terminated Vested			
Under 40	-	-	-
40-49	9	\$194,956	\$21,662
50-59	61	\$1,774,319	\$29,087
60-69	36	\$892,832	\$24,801
Over 70	-	-	-
Total	106	\$2,862,107	\$27,001

Section 6 - Basis of the Actuarial Valuation

Section 6.1

Summary of Plan and Contribution Provisions

Eligibility—All full-time permanent employees of the Chicago Transit Authority are included in the Plan after completing 12 months of continuous service unless specifically excluded by the terms of a collective bargaining agreement. Exempt non-vested employees may opt out of the plan. Chicago Transit Authority Board members are not included.

Contributions—The Chicago Transit Authority will contribute a percent of compensation for all participating employees and each participating employee will contribute a percent of his compensation to the Plan:

Annual Contributions to the Plan (Percentage of Compensation)	
Authority	Employees
18.019%	12.010%

For years through 2040, the amount paid by the Authority with respect to debt service on bonds issued for contribution to the Retirement Plan shall be treated as a credit against the amount of required contribution up to an amount not to exceed six percent of compensation paid by the Authority in the following year. The amount paid in debt service is always greater than six percent of projected compensation.

In order to be eligible for the credit, the debt service payment may not be paid with the proceeds of bonds or notes issued by the CTA for any calendar year after 2008. Buck has confirmed that the debt service payment for the year triggering the credit was not paid with the proceeds of bonds or notes issued by the CTA for any calendar year after 2008.

Minimum contributions as set forth elsewhere in this report may also apply.

Normal Retirement—The normal retirement age is 65. For employees retiring on or after January 1, 2001 the annual normal retirement pension is equal to the sum of (a) and (b) below, but not greater than 70.0% of the employee's average annual compensation:

- (a) 1% of the employee's past service compensation as of May 31, 1948, for each full year of continuous service prior to June 1, 1949, plus
- (b) 2.15% of average annual compensation for each year (and fraction of completed calendar months) of continuous service after June 1, 1949.

Average annual compensation is equal to the highest average compensation over any four calendar years out of the final 10 calendar years prior to normal retirement (or actual retirement, if later). If an employee has at least 20 years of service, his minimum annual pension is \$2,220.

Section 6.1

Summary of Plan and Contribution Provisions, continued

Early Retirement:

Employees hired before January 18, 2008: An employee may retire early after attaining age 55 and completing at least three years of continuous service, or after completion of 25 years of continuous service. The early retirement pension is equal to the accrued normal retirement pension based on compensation and service at early retirement, reduced by 5% for each year or fraction younger than age 65. The 5% per year reduction is not applied if the employee has at least 25 years of service. Employees hired after September 5, 2001 may retire early with unreduced benefits after attaining age 55 and completing at least 25 years of service.

Employees hired on and after January 18, 2008: An employee may retire with unreduced benefits upon attainment of age 64 with 25 years of service. An employee may retire with a benefit reduced as described above upon attainment of age 55 with 10 years of continuous service.

Disability Allowance:

An employee is eligible for a disability allowance if he becomes disabled after completing 10 years of service, or if his disability after completing five years of service is covered under the Workmen's Compensation Act. An employee is disabled if he either (a) is totally and permanently disabled or (b) is unable to return to work at their same job after receiving 26 weeks of benefits under the Authority's Group Accident and Sickness Insurance or from the Authority under the Workmen's Compensation Act. The disability allowance is equal to the normal retirement pension based on compensation and service at disability subject to a minimum annual pension of \$4,800.

Death Benefits:

If an employee dies prior to retirement or disability and after one year of service, his contributions, accumulated with interest, are paid to his beneficiary. "Interest" is equal to the rate of interest earned by the Fund (to a maximum of 2%) prior to January 1, 1971, 1/2 of the rate of interest earned by the Fund (to a maximum of 3%) between January 1, 1971, and January 1, 1980, and 3% after December 31, 1979. If an employee dies after 90 days of service but prior to one year of service, his contributions, without interest, are paid to his beneficiary; and if he dies prior to 90 days of service, his contributions are not refunded.

If an employee is eligible for early retirement, he is automatically covered by a surviving spouse benefit, payable upon his death prior to retirement, in lieu of a return of his contributions. The spouse benefit is equal to 1/2 of the pension which would have been payable to the employee if he had retired on the first day of the month of his death and had elected an optional form of pension providing 1/2 of his reduced pension to his surviving spouse. Employees may elect not to be covered by this option and provide for the payment of their contributions with interest to their beneficiary in lieu thereof.

If an employee dies after his retirement pension has commenced, his beneficiary receives the excess, if any, of his contributions, accumulated with interest to his retirement date, over the sum of the pension payments made to him. However, if his surviving spouse is entitled to a pension after his death, such excess will not be paid to his beneficiary. At the death of the surviving spouse, the excess, if any, of the contributions accumulated with interest to his retirement date over the sum of the pension payments made to him and his surviving spouse will be paid.

Section 6.1

Summary of Plan and Contribution Provisions, continued

A retired employee's beneficiary will receive a death benefit equal to the amount from the following schedule according to the employee's age and service at retirement:

Age	Service	Age + Service	Death Benefit
65	20	N/A	\$8,000
60	N/A	90	\$8,000
N/A	25	N/A	\$8,000
N/A	N/A	94	\$8,000
60-64	20	N/A	\$6,000
55-59	20	N/A	\$5,000
All Others			\$2,000

Termination Benefits:

If an employee terminates his employment prior to eligibility for retirement or disability and after completing one year of service, he receives a refund of his contributions plus interest (3% after December 31, 1979). If he terminates after 90 days but prior to one year, he receives his contributions without interest, and if he terminates less than 90 days after hire, he receives no refund. If an employee has completed 10 years of continuous service and elects to leave his contributions in the Plan, he remains entitled to his normal retirement pension beginning at age 65 but based on his compensation and service at termination.

Optional Benefit Forms:

In lieu of a normal pension, an employee may elect an optional annuity of equivalent actuarial value providing payments of 1/2, 2/3, or all of his reduced pension to his spouse after his death (Option A).

Alternatively, an employee may elect an optional annuity of equivalent actuarial value providing payments of 1/2, 2/3, or all of his reduced pension to his spouse after his death with the further provision that his benefit will be restored to the full amount to him after the death of his spouse (Option B).

Retired Employees:

Benefits for retired employees have been valued according to benefits in effect at time of retirement as modified by subsequent amendments. Such benefits are kept on records maintained by the Authority.

Section 6.1

Summary of Plan and Contribution Provisions, continued

Voluntary Early Retirement Incentive Program:

During 1997, the Plan was amended to offer enhanced retirement benefits to all employees who have at least 25 years of continuous service on or before December 31, 1999, and who have not retired prior to January 1, 1997. Those eligible on or before June 30, 1997 must elect to participate during the period March 1, 1997, to June 30, 1997. Employees eligible during the period July 1, 1997, to December 31, 1999, must elect to participate between July 1, 1997, and February 28, 1998. All eligible employees who elect to participate must retire no later than December 31, 1999. The benefit is determined based on a formula multiplier of 2.40% of average annual compensation with the benefit cap at 70.0% of such average annual compensation.

Ad hoc increases in retiree benefits:

As part of the Arbitration Award ruling of November 13, 2003, the following ad hoc increases were given to retirees in payment status as of January 1, 2000:

- (a) \$75 per month for members retired before January 1, 1980
- (b) \$50 per month for members who retired on or after January 1, 1980, but before January 1, 1991
- (c) \$40 per month for members who retired on or after January 1, 1991, but before January 1, 2000

As part of an Arbitration Award ruling of June 26, 2007, another ad hoc adjustment was made for participants.

Contribution Requirements Under P.A. 95-0708

Beginning January 18, 2008, the Authority shall make contributions to the Retirement Plan in an amount equal to 12 percent of compensation and participating employees shall make contributions in an amount equal to six percent of compensation. For years through 2040, the amount paid by the Authority with respect to debt service on bonds issued for contribution to the Retirement Plan shall be treated as a credit against the amount of required contribution, up to an amount not to exceed six percent of compensation paid by the Authority in the following year.

If the funded ratio is projected to decline below 60 percent in any year before 2040 using reasonable actuarial assumptions and the projected unit credit funding method, the contribution shall be increased so that the funded ratio is not projected to drop below 60 percent. If the funded ratio actually drops below 60 percent in any year before 2040, the contribution shall be increased so that the funded ratio is projected to reach 60 percent within 10 years. The increase in contributions shall be effective as of the January 1 following the determination, or 30 days following the determination, whichever is later. One-third of the increase in contributions shall be paid by participating employees and two-thirds by the Authority.

Section 6.1

Summary of Plan and Contribution Provisions, continued

Contribution Requirements Under P.A. 95-0708, continued

Beginning in 2040, the minimum contribution for each fiscal year shall be predetermined each year as the amount required to bring the total assets of the Retirement Plan up to 90 percent of the total actuarial liabilities by the end of 2059, using the projected unit credit funding actuarial cost method and reasonable actuarial assumptions. Participating employees shall be responsible for one-third of the required contribution and the Authority shall be responsible for two-thirds of the required contribution.

Beginning in 2060, the minimum contribution for each year shall be an amount needed to maintain the total assets of the Retirement Plan at 90 percent of the total actuarial liabilities of the Plan and the contribution shall be funded one-third by participating employees and two-thirds by the Authority.

Section 6.2

Description of Actuarial Methods and Valuation Procedures

A. Actuarial Cost Method

Liabilities and contributions shown in this report are computed using the **Projected Unit Credit Cost Method** of funding.

Sometimes called a “funding method,” this is a particular technique used by actuaries for establishing the amount and incidence of the annual actuarial cost of pension plan benefits, or normal cost, and the related unfunded actuarial accrued liability. Ordinarily the annual contribution to the plan is comprised of (1) the normal cost and (2) an amortization payment on the unfunded actuarial accrued liability.

Under the Projected Unit Credit Cost Method, the **Normal Cost** for the given year is computed as the present value of the unit of benefit attributable to that year for each active Member. The Normal Cost for the Plan is determined by summing individual results for each active Member.

The **Actuarial Accrued Liability** under this method at any point in time is equal to the present value of benefits accrued to the measurement date using a service pro-rate method.

The **Unfunded Actuarial Accrued Liability** is the excess of the Actuarial Accrued Liability over the Actuarial Value of Plan Assets actually on hand on the valuation date. The Unfunded Actuarial Accrued Liability is amortized as a level dollar amount over a fixed period of 30 years.

Under this method experience gains or losses, i.e. decreases or increases in accrued liabilities attributable to deviations in experience from the actuarial assumptions, adjust the Unfunded Actuarial Accrued Liability.

Section 6.2

Description of Actuarial Methods and Valuation Procedures, continued

B. Asset Valuation Method

The actuarial value of assets is based on a five-year smoothing method and is determined by spreading the effect of each year's investment return in excess of or below the expected return. The Fair Value of assets at the valuation date is reduced by the sum of the following:

1. 80% of the return to be spread during the first year preceding the valuation date,
2. 60% of the return to be spread during the second year preceding the valuation date,
3. 40% of the return to be spread during the third year preceding the valuation date,
4. 20% of the return to be spread during the fourth year preceding the valuation date

C. Valuation Procedures

No actuarial liability is included for members who terminated non-vested prior to the valuation date, except those due a refund of contributions.

The compensation amounts used in the projection of benefits and liabilities were January 1, 2018 rates of pay provided by staff of the Retirement Board of Trustees.

No termination or retirement benefits were projected to be greater than the dollar limitation required by the Internal Revenue Code Section 415 for governmental plans.

Annual increases in salary were limited to the dollar amount defined under Internal Revenue Code Section 401(a)(17) for affected members.

Section 6.3

Summary of Actuarial Assumptions and Changes in Assumptions

Rate of Covered Pay: The rate of covered pay for participants has been estimated at \$595,046,668 for 2018. The following adjustments were made to the actual covered earnings for 2017 supplied by the Authority:

- (a) No earnings or a fractional year of earnings were submitted for employees with a work status date in 2017 who were hired during 2016. We have annualized the 2016 earnings and assumed minimum earnings of \$50,750 per year for this group.
- (b) For employees on layoff, extended leave of absence, or inactive status, we have assumed minimum earnings of \$50,750 per year.
- (c) For all employees, 2018 salary was assumed to increase 1.50% from 2017.

Retiree Benefits: The benefit amounts received for retirees were compared to information received from the Authority for the prior valuation.

Earnings on Plan Assets: 8.25% per annum, compounded annually.

Salary Inflation: 3.25%

Compensation Increases: According to the following table, compounded annually, assumed end of year (includes inflation):

Years of Service	Rate
1	9.00%
2	11.00%
3	16.00%
4	5.00%
>=5	4.00%

Mortality:

- (a) *Active Members* — RP2000 Blue Collar Table, with fully generational projection from 2000 based on Scale BB.
- (b) *Healthy Retirees & Survivors* — RP2000 Blue Collar Table, with fully generational projection from 2000 based on Scale BB.
- (c) *Disabled Retirees* — RP2000 Disabled Table, with fully generational projection from 2000 based on Scale BB.

Section 6.3

Summary of Actuarial Assumptions and Changes in Assumptions, continued

Withdrawals from Service: According to the following table shown for illustrative ages:

Age	Rates of Termination for Reasons Other than Death or Disability
25	7.00%
30	5.10%
35	4.10%
40	2.90%
45	2.40%
50	1.90%
55 & Older	0.00%

If service is 25 or greater, no withdrawal is assumed.

Recovery from disability without returning to work: Disabled members are assumed to recover according to the following table as shown for illustrative ages:

Sample Attained Ages	Disabled Recovery ¹	
	Men	Women
30	0.412%	0.461%
35	0.406%	0.447%
40	0.382%	0.422%
45	0.326%	0.393%
50	0.216%	0.343%
55	0.013%	0.248%
60	0.000%	0.012%
65	0.000%	0.000%
70	0.000%	0.000%
75	0.000%	0.000%
80	0.000%	0.000%

^{1.} Disability recovery after verification of the ability to return to work in the same position as determined by the Plan's Disability manager.

Section 6.3

Summary of Actuarial Assumptions and Changes in Assumptions, continued

Disability Allowance: According to the following table as shown for illustrative ages:

Age	Rate of Disability
25	0.10%
30	0.10%
35	0.20%
40	0.30%
45	0.40%
50	0.50%
55	0.60%
60	0.70%
65 & older	0.78%

Service Retirements:

Age	Pre 1/19/2008 Hires		Post 1/18/2008 Hires	
	Probability of Retirement		Probability of Retirement	
	Service<25	Service>25	Service<25	Service>25
45-54	0.00%	20.00%	0.00%	0.00%
55	1.50%	20.00%	1.50%	1.50%
56	1.50%	22.50%	1.50%	1.50%
57	2.00%	25.00%	2.00%	2.00%
58	2.00%	27.50%	2.00%	2.00%
59	2.00%	30.00%	2.00%	2.00%
60	2.50%	32.50%	2.50%	2.50%
61	4.00%	35.00%	4.00%	4.00%
62	15.00%	37.50%	20.00%	20.00%
63	15.00%	40.00%	15.00%	15.00%
64	20.00%	42.50%	15.00%	15.00%
65	30.00%	45.00%	60.00%	60.00%
66	30.00%	45.00%	25.00%	25.00%
67	30.00%	45.00%	25.00%	25.00%
68	30.00%	45.00%	25.00%	25.00%
69	30.00%	45.00%	25.00%	25.00%
70-74	30.00%	45.00%	30.00%	30.00%
75	100.00%	100.00%	100.00%	100.00%

Spouse Data: 75% of employees eligible at retirement are assumed to be married, 50% of those married are assumed to elect a spouse option (Option A-50%) and the average equivalency factor to convert their accrued pension to a spouse option (Option A-50%) is assumed to be 85%. A wife is assumed to be 3 years younger than her husband. Actual dependent coverage data was used for participants retired as of the valuation date.

Section 6.3

Summary of Actuarial Assumptions and Changes in Assumptions, continued

Miscellaneous and Technical Assumptions:

Pay Increase Timing:	End of (Fiscal) year.
Decrement Timing:	Decrements of all types are assumed to occur mid-year.
Eligibility Testing:	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
Benefit Service:	Exact fractional service from date of participation is used to determine the amount of benefit payable.
Decrement Relativity:	Decrement rates are used directly based on assumptions, without adjustment for multiple decrement table effects.
Decrement Operation:	Disability and turnover do not operate after 25 years of service.

Summary of changes since January 1, 2017 Valuation

None.

Glossary of Terms

Actuarial Accrued Liability	Total accumulated cost to fund pension benefits arising from service in all prior years.
Actuarial Cost Method	Technique used to assign or allocate, in a systematic and consistent manner, the expected cost of a pension plan for a group of plan members to the years of service that give rise to that cost.
Actuarial Present Value of Future Benefits	Amount which, together with future interest, is expected to be sufficient to pay all future benefits.
Actuarial Valuation	Study of probable amounts of future pension benefits and the necessary amount of contributions to fund those benefits.
Actuary	Person who performs mathematical calculations pertaining to pension and insurance benefits based on specific procedures and assumptions.
Annual Required Contribution	Disclosure measure of annual pension cost.
Normal Cost	That portion of the actuarial present value of benefits assigned to a particular year in respect to an individual participant or the plan as a whole.
Unfunded Actuarial Accrued Liability (UAAL)	The portion of the actuarial accrued liability not offset by plan assets.