Park Employees' Annuity and Benefit Fund of Chicago

Actuarial Valuation and Review as of December 31, 2017

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Board of Trustees
Park Employees' Annuity and Benefit Fund of Chicago
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Dear Board Members:

We are pleased to submit this annual Actuarial Valuation and Review as of December 31, 2017. It summarizes the actuarial data used in the valuation, establishes the net pension liability under Governmental Accounting Standards Board (GASB) Statement No. 67 and the funding requirements for the fiscal year ending December 31, 2018, and analyzes the preceding year's experience.

This report was prepared in accordance with generally accepted actuarial principles and practices at the request of the Board to assist in administering the Park Employees’ Annuity and Benefit Fund of Chicago.

Asset and Membership Data

The census information and financial information on which our calculations were based was prepared by the Fund staff. That assistance is gratefully acknowledged. We have not subjected the census data to any auditing procedures, but have examined the data for reasonableness and consistency with the prior year’s data.

Plan Changes

Since the effective date of the last actuarial valuation, the remaining portions of Public Act 098-0622 were declared unconstitutional. As a result of this declaration, all benefit, eligibility, and funding provisions will be restored to as they were immediately before the implementation of the aforementioned Public Act. This valuation reflects these benefit and funding provision changes.

Actuarial Assumptions and Methods

The actuarial assumptions and methods are set by the Board of Trustees, based upon recommendations made by the Fund's actuary. The assumptions and methods used for the December 31, 2017 actuarial valuation were based on an experience analysis covering the five-year period ending June 30, 2012 and were adopted by the Board, effective for the December 31, 2012 valuation. These actuarial assumptions and methods comply with the parameters set by the Actuarial Standards of Practice and the parameters for disclosure in GASB Statement No. 67. The investment return assumption is based on the Fund being invested according to the target asset allocation in the Investment Policy Statement. To the extent that the liquidation of assets to pay benefit payments and expenses requires a shift in investment allocation to more liquid, lower return asset classes, a lower discount rate may be required in the future.

Funding Adequacy

The funding policy of the Fund, mandated by statute, is to have contributions sufficient to amortize the unfunded liability over the 30-year period ending December 31, 2042. For Fiscal 2018, employer contributions come from a property tax levied by the Chicago Park District equal to the total amount of contributions made by employees in the calendar year two years prior to the year of the levy, multiplied by 1.1. The 1.1 factor is known as the tax multiple.

The funding methods mandated by the Illinois Pension Code are insufficient to avoid insolvency, and without a change, the Fund is in imminent danger of insolvency and the assets are projected to be depleted in the next ten years (during 2027). We strongly recommend an actuarial funding method that targets 100% funding with payments at least covering interest on the unfunded actuarial accrued and a portion of the principal balance. If the Fund becomes insolvent, the employer will be required to make contributions on a "pay as you go" basis, which means the employer would have to pay all benefits as they become due.

Financial Results and Membership Data

This report includes the following schedules for the financial section of the Comprehensive Annual Financial Report:

- Schedule of Changes in Employer's Net Pension Liability
- Schedule of Employer's Net Pension Liability
- Schedule of Employer Contributions

The actuarial section of the Comprehensive Annual Financial Report includes this actuarial valuation report replicated in its entirety. Therefore, this report includes all of the supporting schedules in the actuarial section.

Limitation of Actuarial Measurements

The measurements shown in this actuarial valuation may not be applicable for other purposes. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or 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.

Qualifications

The actuarial calculations were directed under our supervision. We are members of the American Academy of Actuaries and we meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. To the best of our knowledge, the information supplied in the actuarial valuation is complete and accurate. Further, in our opinion, the assumptions as approved by the Board are reasonably related to the experience of and the expectations for the Fund.

We look forward to reviewing this report at your next meeting.

Sincerely,

Segal Consulting, a Member of The Segal Group, Inc.

By: Kim Nicholl   Matthew A. Strom

Kim Nicholl, FSA, MAAA, EA, FCA	Matthew A. Strom, FSA, MAAA, EA
Senior Vice President and Actuary	Vice President and Actuary

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Purpose

This report has been prepared by Segal Consulting to present a valuation of the Park Employees' Annuity and Benefit Fund of Chicago (the Fund) as of December 31, 2017. The valuation was performed to determine whether the assets and contributions are sufficient to provide the prescribed benefits. The contribution requirements presented in this report are based on:

- The benefit provisions of the Fund, as outlined in 40 ILCS 5/12 and administered by the Board;
- The characteristics of covered active participants, inactive vested participants, and retired participants and beneficiaries as of December 31, 2017, provided by Fund staff;
- The assets of the Fund as of December 31, 2017, provided by Fund staff;
- Economic assumptions regarding future salary increases and investment earnings; and
- Other actuarial assumptions, regarding employee terminations, retirement, death, etc.

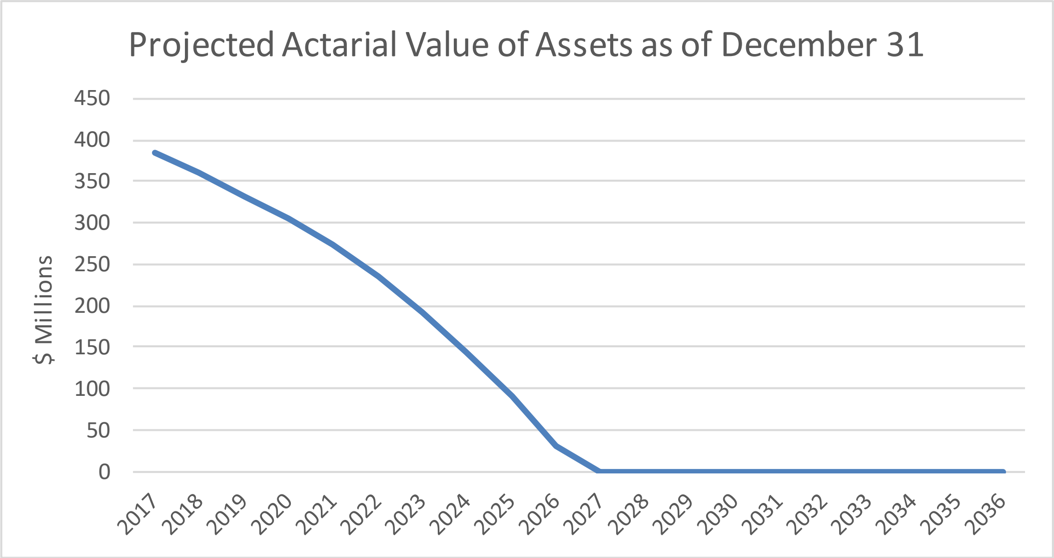
Significant Issues in Valuation Year

The following key findings were the result of this actuarial valuation:

1. Since the last valuation, the remaining portions of Public Act 098-0622 were declared unconstitutional in their entirety. The following changes have been reflected, effective with this valuation:
   - Tier 1 members’ retirement age was lowered to the age of 50.
   - Tier 2 members’ normal and early retirement age were raised from 65 and 60 to 67 and 62, respectively.
   - Tier 2 automatic annual increases start at age 67.
   - Occupational disability benefit is increased to 75% of salary.
   - Member contributions decrease to 9% of payroll for all future years.
   - The tax multiple is 1.1 for all years.

   These changes increased the liability by $20.9 million, decreased the funded ratio by 0.8%, and increased the actuarially determined contribution requirement by 6.5%.

2. **As a result of the tax multiple reverting back to 1.1 for all years, projected contributions for all years decreased, and the Fund is now projected to become insolvent during 2027. The graph below shows a 20-year projection of the actuarial value of assets. A 40-year projection of the Fund's financial status is shown in Exhibit V.**



3. **The funding methods mandated by the Illinois Pension Code are inadequate to appropriately fund the Park Employees' Annuity and Benefit Fund of Chicago. We strongly recommend an actuarial funding method that targets 100% funding with payments at least covering interest on the unfunded actuarial accrued and a portion of the principal balance.**

4. The funded ratio based on the actuarial value of assets over the actuarial accrued liability as of December 31, 2017, is 37.1%, compared to 39.1% as of December 31, 2016. This ratio is a measure of funding status, its history is a measure of funding progress. Using the fair value of assets, the funded ratio as of December 31, 2017, is 38.3%, compared to 39.0% as of December 31, 2016. These measurements are not necessarily appropriate for assessing the sufficiency of Fund assets to cover the estimated cost of settling the Fund's benefit obligation or the need for or the amount of future contributions.

5. Employer contributions to the Fund come from a tax levied upon all taxable property in the City of Chicago. The amount of tax that is levied is 1.1 times the amount of employee contributions made two years prior. The 1.1 factor is known as the tax multiple. As shown in Chart 13, for the fiscal year beginning January 1, 2018, the actuarially determined contribution amount (ADC) is $50,929,734. Based on the 1.1 tax multiple, and using the Fund’s assumption of 3% loss on collections, we have estimated the employer contribution for the fiscal year beginning January 1, 2018, to be $12,798,291. **Compared to the ADC of $50,929,734, the contribution deficiency is $38,131,443 as of January 1, 2018. In the prior fiscal year, actual contributions were $24,332,624 less than the ADC. Each year of a contribution deficiency leads to an increased deficiency in all future years.**
6. For the year ended December 31, 2017, Segal has determined that the asset return on a fair value basis was 13.9%. After gradual recognition of investment gains and losses under the actuarial smoothing method, the actuarial rate of return was 10.0%. This represents an experience gain when compared to the assumed rate of 7.5%. As of December 31, 2017, the actuarial value of assets ($385.4 million) represents 96.9% of the fair value ($397.6 million).
7. The portion of deferred investment gains and losses recognized in the calculation of the December 31, 2017, actuarial value of assets resulted in a gain of $9,210,392. Additionally, the demographic and liability experience resulted in a $3,050,770 loss.
8. The total unrecognized investment gain as of December 31, 2017, is $12,229,252. This investment gain will be recognized in the determination of the actuarial value of assets for funding purposes in the next few years, to the extent it is not offset by recognition of investment losses derived from future experience. This implies that earning the assumed rate of investment return of 7.5% per year (net of expenses) on a **fair value** basis will result in investment gains on the actuarial value of assets in the next few years. Therefore, if the actual fair value return is equal to the assumed 7.5% rate and all other actuarial assumptions are met, the contribution requirements would decrease over the next few years.
9. As mentioned above, the current method used to determine the actuarial value of assets yields an amount that is 96.9% of the fair value of assets as of December 31, 2017. Guidelines in Actuarial Standard of Practice No. 44 (Selection and Use of Asset Valuation Methods for Pension Valuations) recommend that asset values fall within a reasonable range around the corresponding fair value. We believe the actuarial asset method currently complies with these guidelines.

10. When measuring pension liability for GASB purposes, the same actuarial cost method (Entry Age method) is used for funding purposes. However, as of December 31, 2017, the GASB blended discount rate calculation results in a lower discount rate (3.65%) than is used for funding purposes (7.50%). This means that the total pension liability (TPL) measure for financial reporting shown in this report will differ from the actuarial accrued liability (AAL) measure for funding. We note that the same is true for the normal cost component of the annual plan cost for funding and financial reporting.
11. The net pension liability (NPL) is equal to the difference between the Total Pension Liability (TPL) and the Plan's fiduciary net position. The Plan's fiduciary net position is equal to the fair value of assets. The NPL as of December 31, 2017, is $1,218,329,825.
12. Since Public Act 098-0622 has now been overturned in its entirety, the TPL and NPL measures have increased, primarily as a result of the lower discount rate that is required due to the blended discount rate calculation under paragraphs 44 and 45 of Statement 67.
13. The quinquennial experience study is in process and it is expected that assumptions will be modified effective with the December 31, 2018 actuarial valuation. The net impact of recommended assumption changes is expected to increase the actuarial accrued liability and normal cost rate.
14. In November 2014, the Society of Actuaries Retirement Plans Experience Committee published the RP-2014 Mortality Tables Report, which includes mortality experience covering the years 2004 through 2008. The current Fund post-retirement mortality assumption was studied in 2012 as part of a five-year experience analysis. We considered whether the new RP-2014 mortality tables should be used in this December 31, 2017, actuarial valuation, but given that the Fund has experienced mortality gains over the past several years, we were inclined to evaluate the applicability of the RP-2014 tables relative to the Fund in the context of all the other demographic assumptions as part of the experience study planned for 2018.
15. This actuarial report as of December 31, 2017, is based on financial data as of that date. Changes in the value of assets subsequent to that date are not reflected. Declines in asset values will increase the cost of the plan, while increases in asset values (in excess of expected) will decrease the cost of the plan.

Summary of Key Valuation Results

	2018	2017
Contributions for fiscal year beginning:		
Actuarially determined contribution requirement	$50,929,734	$45,253,238
Estimated employer contributions (provided by the Fund, reflecting 3% loss on collections)	12,798,291	20,175,936
Actual employer contribution	--	20,920,614
Funding elements for fiscal year beginning:		
Employer normal cost, including administrative expenses	$4,640.403	$2,830,000
Fair value of assets	397,648,758	391,698,922
Actuarial value of assets	385,419,506	393,604,997
Actuarial accrued liability	1,039,279,444	1,005,493,093
Unfunded actuarial accrued liability	653,859,938	611,888,096
Funded ratio	37.09%	39.15%
GASB Information:		
Long-term expected rate of return	7.50%	7.50%
Municipal bond index	3.44%	3.78%
Single equivalent discount rate	3.65%	5.82%
Total pension liability	$1,624,571,524	$1,204,218,956
Plan fiduciary net position	397,648,758	391,698,922
Net pension liability	1,226,922,766	812,520,034
Plan fiduciary net position as a percentage of total pension liability	24.48%	32.53%
Demographic data for plan year beginning:		
Number of retired participants and beneficiaries	2,876	2,870
Number of vested former participants	150	149
Number of active participants	3,543	3,114
Total salary supplied by the Fund	$134,258,328	$124,502,908
Average salary	37,894	39,982

Important Information About Actuarial Valuations

An actuarial valuation is a budgeting tool with respect to the financing of future projected benefit obligations. It is an estimated forecast – the actual long-term cost of the Fund will be determined by the actual benefits and expenses paid and the actual investment experience of the Fund.

In order to prepare a valuation, Segal Consulting ("Segal") relies on a number of input items. These include:

- **Plan of benefits** Plan provisions define the rules that will be used to determine benefit payments, and those rules, or the interpretation of them, may change over time. Even where they appear precise, outside factors may change how they operate. It is important to keep Segal informed with respect to plan provisions and administrative procedures, and to review the plan summary included in our report to confirm that Segal has correctly interpreted the plan of benefits.
- **Participant data** An actuarial valuation for the Fund is based on data provided to the actuary by Fund staff. Segal does not audit such data for completeness or accuracy, other than reviewing it for obvious inconsistencies compared to prior data and other information that appears unreasonable. It is important for Segal to receive the best possible data and to be informed about any known incomplete or inaccurate data.
- **Assets** The valuation is based on the fair value of assets as of the valuation date, as provided by Fund staff, and uses an "actuarial value of assets" that differs from fair value to gradually reflect year-to-year changes in the fair value of assets in determining the contribution requirements.
- **Actuarial assumptions** In preparing an actuarial valuation, Segal projects the benefits to be paid to existing plan members for the rest of their lives and the lives of their beneficiaries. This projection requires actuarial assumptions as to the probability of death, disability, withdrawal, and retirement of each member for each year. In addition, the benefits projected to be paid for each of those events in each future year reflect actuarial assumptions as to salary increases and cost-of-living adjustments. The projected benefits are then discounted to a present value, based on the assumed rate of return that is expected to be achieved on the Fund's assets. There is a reasonable range for each assumption used in the projection and the results may vary materially based on which assumptions are selected. It is important for any user of an actuarial valuation to understand this concept. Actuarial assumptions are periodically reviewed to ensure that future valuations reflect emerging plan experience. While future changes in actuarial assumptions may have a significant impact on the reported results, that does not mean that the previous assumptions were unreasonable.

The user of Segal's actuarial valuation (or other actuarial calculations) should keep the following in mind:

- The actuarial valuation is prepared at the request of the Board. Segal is not responsible for the use or misuse of its report, particularly by any other party.
- An actuarial valuation is a measurement of the Fund's assets and liabilities at a specific date. Accordingly, except where otherwise noted, Segal did not perform an analysis of the potential range of future financial measures. The actual long-term cost of the Fund will be determined by the actual benefits and expenses paid and the actual investment experience of the Fund.
- If the Board is aware of any event or trend that was not considered in the valuation that may materially change the results of the valuation, Segal should be advised, so that we can evaluate it.
- Segal does not provide investment, legal, accounting, or tax advice. Segal's valuation is based on our understanding of applicable guidance in these areas and of the Fund's provisions, but they may be subject to alternative interpretations. The Board should look to their other advisors for expertise in these areas.
- The measurements shown in this actuarial valuation may not be applicable for other purposes. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period); and changes in plan provisions or applicable law.

As Segal has no discretionary authority with respect to the management or assets of the Fund, it is not a fiduciary in its capacity as actuaries and consultants with respect to the Fund.

A. MEMBER DATA

The Actuarial Valuation and Review considers the number and demographic characteristics of covered members, including active members, inactive members, retirees and beneficiaries.

This section presents a summary of significant statistical data on these participant groups.

More detailed information for this valuation year and the preceding valuation can be found in Section 3, Exhibits A, B, and C.

A historical perspective of how the member population has changed over the past ten valuations can be seen in this chart.

CHART 1

Member Population: 2009 – 2017

Census Date	Active Members	Vested Terminated Members*	Retirees and Beneficiaries**	Ratio of Actives to Retirees and Beneficiaries
June 30, 2009	2,865	159	3,013	0.95
June 30, 2010	2,816	160	2,956	0.95
June 30, 2011	2,795	141	2,913	0.96
June 30, 2012	2,977	153	2,921	1.02
December 31, 2012	3,053	152	2,906	1.05
December 31, 2013	3,076	148	2,904	1.06
December 31, 2014	2,973	147	2,891	1.03
December 31, 2015	3,063	145	2,876	1.07
December 31, 2016	3,114	149	2,870	1.09
December 31, 2017	3,543	150	2,876	1.23

** Excludes terminated members due a refund of employee contributions.*

*** Excludes QILDROs*

Active Members

Plan costs are affected by the age, years of service and payroll of active members. In this year's valuation, there were 3,543 active members with an average age of 41.0, average years of service of 9.8 years and average salary of $37,894. The 3,114 active participants in the prior valuation had an average age of 41.3, average years of service of 11.2 years and average salary of $39,982.

Inactive Participants

In this year's valuation, there were 150 members with a vested right to a deferred or immediate vested benefit.

In addition, there were 4,148 members entitled to a return of their employee contributions.

These graphs show a distribution of active members by age and by years of service.

CHART 2

Distribution of Active Members by Age as of December 31, 2017

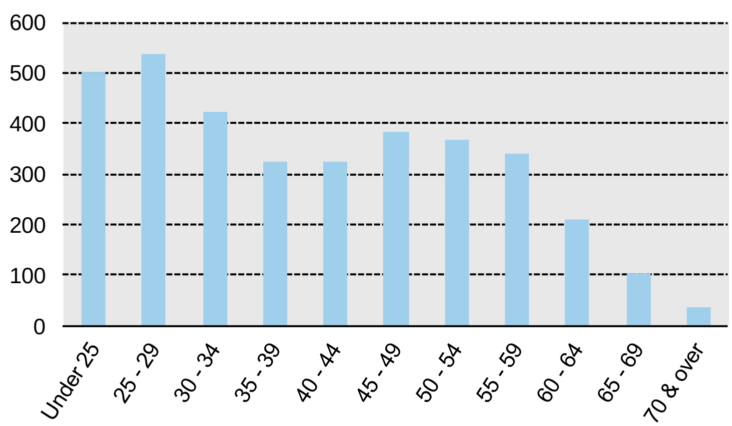
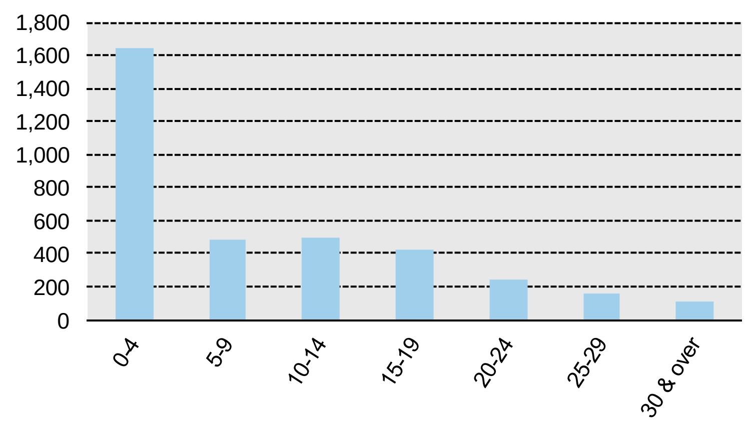


CHART 3

Distribution of Active Members by Years of Service as of December 31, 2017



Retirees and Beneficiaries
As of December 31, 2017, 2,115 retirees, 745 beneficiaries, and 16 dependent children were receiving total monthly benefits of $6,007,570. For comparison, in the previous valuation, there were 2,113 retirees, 744 beneficiaries, and 13 dependent children receiving monthly benefits of $5,890,068.

These graphs show a distribution of the current retirees based on their monthly amount and age.

CHART 4

Distribution of Retirees by Monthly Amount as of December 31, 2017

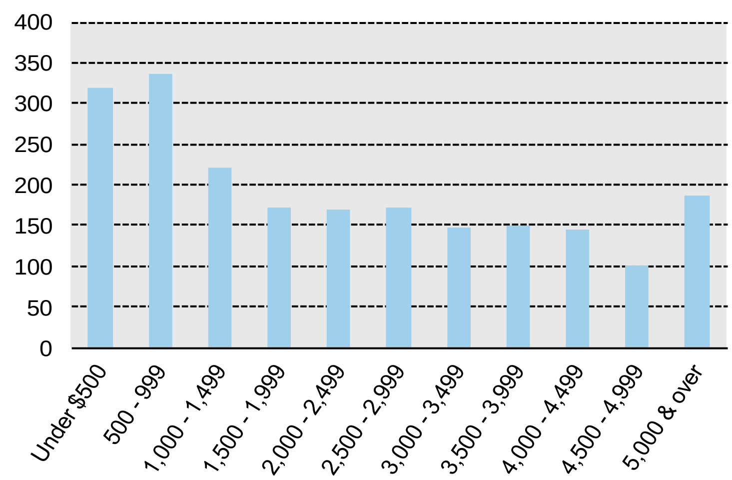
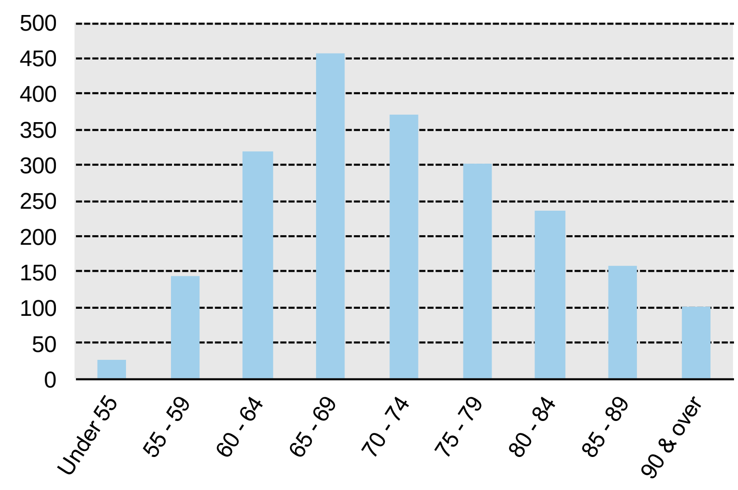


CHART 5

Distribution of Retirees by Age as of December 31, 2017



B. FINANCIAL INFORMATION

It is desirable to have level and predictable plan costs from one year to the next. For this reason, the Board has approved an asset valuation method that gradually adjusts to fair value. Under this valuation method, the full value of market fluctuations is not recognized in a single year and, as a result, the asset value and the plan costs are more stable.

The amount of the adjustment to recognize fair value is treated as income, which may be positive or negative. Realized and unrealized gains and losses are treated equally and, therefore, the sale of assets has no immediate effect on the actuarial value.

The chart shows the determination of the actuarial value of assets as of the valuation date.

CHART 6

Determination of Actuarial Value of Assets for Fiscal Years Ended December 31

				2017		2016
1.	Actuarial value of assets as of prior valuation date			$393,604,997		$395,652,106
2.	Employer and employee contributions and other income			34,599,674		43,136,965
3.	Benefits and expenses			79,820,163		75,615,575
4.	Expected investment income			27,824,606		28,455,960
5.	Total investment income, including income for securities lending			51,170,325		31,022,194
6.	Investment gain/(loss): (5) – (4)			23,345,719		2,566,234
7.	Expected actuarial value of assets: (1) + (2) – (3) + (4)			376,209,114		391,629,456
8.	Calculation of unrecognized return	Original Amount*	% Recognized		% Recognized	
	(a) Year ended December 31, 2017	$23,345,719	20%	4,669,144	--	--
	(b) Year ended December 31, 2016	2,566,234	20%	513,247	20%	$513,247
	(c) Year ended December 31, 2015	-19,526,450	20%	-3,905,290	20%	-3,905,290
	(d) Year ended December 31, 2014	-888,039	20%	-177,608	20%	-177,608
	(e) Year ended December 31, 2013	36,656,285	20%	7,331,257	20%	7,331,257
	(f) 6-month period ended December 31, 2012	7,796,423	10%**	779,642	20%	1,559,285
	(g) Year ended June 30, 2012	-33,453,504			10%**	-3,345,350
	(h) Total recognized return			9,210,392		1,975,541
9.	Actuarial value of assets as of current valuation date: (7) + (8h)			$385,419,506		$393,604,997

* *Total return minus expected return on actuarial value*

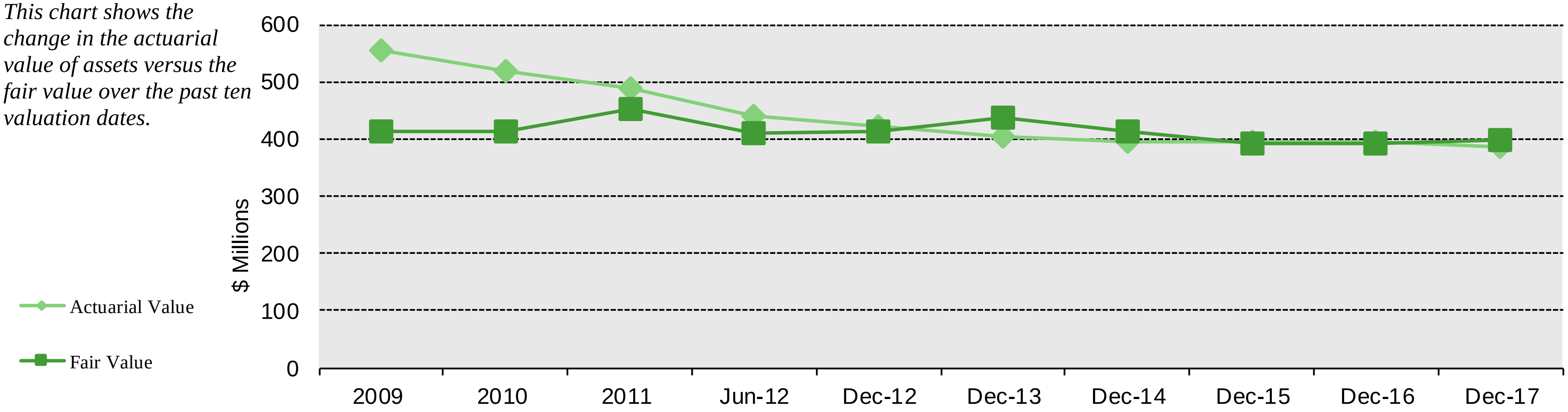
** *10% was recognized, instead of 20%, due to the short fiscal year ended December 31, 2012 in order to maintain a 5-year smoothing period.*

Both the actuarial value and fair value of assets are representations of the fund’s financial status. As investment gains and losses are gradually taken into account, the actuarial value of assets tracks the fair value of assets. The actuarial asset value is significant because the Fund’s liabilities are compared to these assets to determine what portion, if any, remains unfunded. Amortization of the unfunded actuarial accrued liability is an important element in determining the contribution requirement.

CHART 7

Actuarial Value of Assets vs. Fair value of Assets as of June 30, 2009 – December 31, 2017

This chart shows the change in the actuarial value of assets versus the fair value over the past ten valuation dates.



C. ACTUARIAL EXPERIENCE

To calculate the actuarially determined contribution requirement, assumptions are made about future events that affect the amount and timing of benefits to be paid and assets to be accumulated. Each year actual experience is measured against the assumptions. If overall experience is more favorable than anticipated (an actuarial gain), the contribution requirement will decrease from the previous year. On the other hand, the contribution requirement will increase if overall actuarial experience is less favorable than expected (an actuarial loss).

Taking account of experience gains or losses in one year without making a change in assumptions reflects the belief that the single year's experience was a short-term development and that, over the long term, experience will return to the original assumptions. For contribution requirements to remain stable, assumptions should approximate experience.

If assumptions are changed, the contribution requirement is adjusted to take into account a change in experience anticipated for all future years.

The total gain is $6,094,619; $9,210,392 from investment gains and $3,115,773 in losses from all other sources. The net experience variation from individual sources other than investments was 0.3% of the actuarial accrued liability. A discussion of the major components of the actuarial experience is on the following pages.

This chart provides a summary of the actuarial experience during the past year.

CHART 8

Actuarial Experience for Year Ended December 31, 2017

1.	Net gain from investments*	$9,210,392
2.	Net loss from administrative expenses	(65,003)
3.	Net loss from other experience**	(3,050,770)
4.	Net experience gain: (1) + (2) + (3)	$6,094,619

* *Details in Chart 9.*

** *Details in Chart 12.*

Investment Rate of Return
A major component of projected asset growth is the assumed rate of return. The assumed return should represent the expected long-term rate of return, based on the Fund’s investment policy. For valuation purposes, the assumed rate of return on the actuarial value of assets is 7.50%. The actual rate of return on an actuarial basis for the year ended December 31, 2017, was 9.98%.

Since the actual return for the year was greater than the assumed return, the Fund experienced an actuarial gain during the fiscal year ended December 31, 2017, with regard to its investments.

This chart shows the gain/(loss) due to investment experience.

CHART 9

Actuarial Value Investment Experience for Year Ended December 31, 2017

1.	Actual return	$37,034,998
2.	Average value of assets	370,994,753
3.	Actual rate of return: (1) ÷ (2)	9.98%
4.	Assumed rate of return	7.50%
5.	Expected return: (2) x (4)	$27,824,606
6.	Actuarial gain: (1) – (5)	$9,210,392

Because actuarial planning is long term, it is useful to see how the assumed investment rate of return has followed actual experience over time. The chart below shows the rate of return on an actuarial basis compared to the fair value investment return for the last ten valuation years, including five-year and ten-year averages.

Chart 10

Investment Return

Fiscal Year Ended	Fair value	Actuarial Value
June 30, 2009	-18.6%	2.0%
June 30, 2010	11.3%	1.5%
June 30, 2011	21.0%	3.1%
June 30, 2012	0.9%*	-0.6%*
December 31, 2012	6.3%*	1.0%*
December 31, 2013	16.9%**	6.5%*
December 31, 2014	6.9%**	10.4%*
December 31, 2015	1.9%**	8.2%*
December 31, 2016	8.4%**	8.0%*
December 31, 2017	14.3%**	10.0%*
Average Returns		
Last 5 valuation years:	9.5%	8.6%
Last 10 valuation years:	6.7%	5.2%

* *As determined by Segal*

** *As determined by Investment Consultant*

Subsection B described the actuarial asset valuation method that gradually takes into account fluctuations in the fair value rate of return. The effect of this is to stabilize the actuarial rate of return, which contributes to leveling the actuarially required contribution.

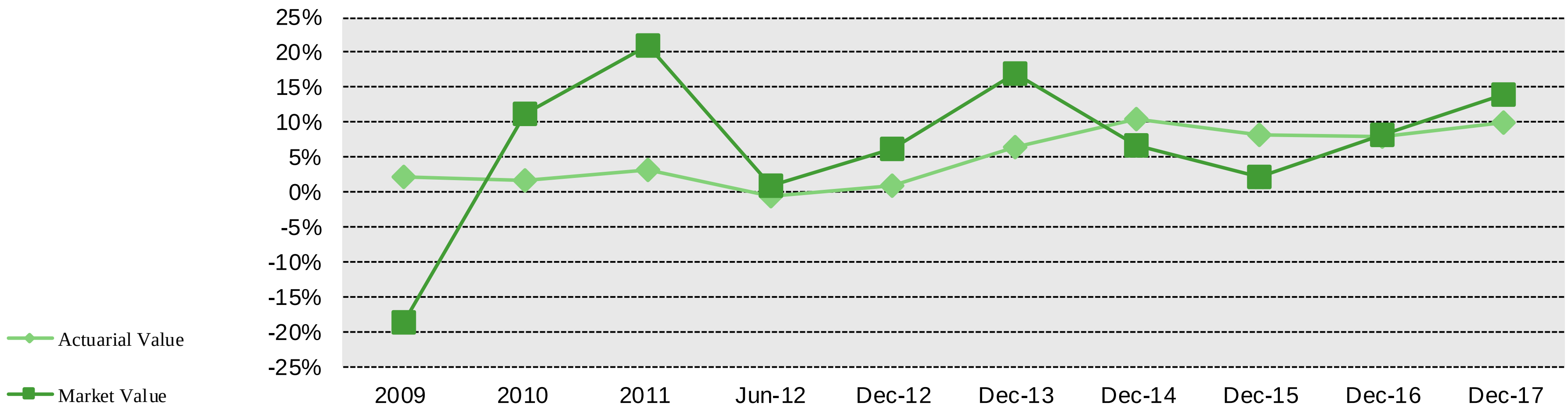
Administrative Expenses

Administrative expenses for the year ended December 31, 2017 totaled $1,682,136 compared to the assumption of $1,562,280. This resulted in a loss of $65,003 for the year when adjusted for timing.

This chart illustrates how this leveling effect has actually worked over the years 2009 - 2017.

CHART 11

Fair and Actuarial Rates of Return for Years Ended June 30, 2009 – December 31, 2017



Other Experience

There are other differences between the expected and the actual experience that appear when the new valuation is compared with the projections from the previous valuation. These include:

- the extent of turnover among the participants,
- retirement experience (earlier or later than expected),
- mortality (more or fewer deaths than expected),
- the number of disability retirements, and
- salary increases different than assumed.

The net loss from this other experience for the year ended December 31, 2017, amounted to $3,050,770, which is 0.3% of the actuarial accrued liability.

A brief summary of the demographic gain/(loss) experience of the Fund for the year ended December 31, 2017 is shown in the chart below.

The chart shows elements of the experience gain/(loss) for the most recent year.

CHART 12

Experience Due to Changes in Demographics for Year Ended December 31, 2017

1.	Turnover	-$3,025,646
2.	Retirement	-498,123
3.	Experience among retired members and beneficiaries related to mortality	1,394,002
4.	Salary/service increase for continuing actives	944,538
5.	Other	-1,865,541
6.	Total	-$3,050,770

D. DEVELOPMENT OF EMPLOYER COSTS

The amount of actuarially determined contribution is comprised of an employer normal cost payment and a payment on the unfunded actuarial accrued liability. This total amount is then divided by the projected payroll for active members to determine the actuarially determined contribution of 36.31% of payroll.

The actuarially determined contribution had been based on a 30-year, level percentage of pay amortization of the unfunded actuarial accrued liability. In April 2013, the Board of Trustees elected to close the 30-year amortization period, which ends on December 31, 2042. As of January 1, 2018, there are 25 years remaining on the amortization period.

The chart compares this valuation's actuarially determined contribution with the prior valuation.

CHART 13

Actuarially Determined Contribution

	Year Beginning January 1			
	2018		2017	
	Amount	% of Payroll	Amount	% of Payroll
1. Total normal cost	$15,544,766	11.08%	$14,287,888	11.00%
2. Administrative expenses	1,709,027	1.22%	1,562,280	1.20%
3. Expected employee contributions	-12,777,222	-9.11%	-13,120,083	-10.10%
4. Employer normal cost: (1) + (2) + (3)	4,476,571	3.19%	$2,730,085	2.10%
5. Employer normal cost, adjusted for timing*	4,640,403	3.31%	2,830,000	2.18%
6. Actuarial accrued liability	1,039,279,444		1,005,493,093	
7. Actuarial value of assets	385,419,506		393,604,997	
8. Unfunded actuarial accrued liability: (6) - (7)	653,859,938		$611,888,096	
9. Payment on unfunded actuarial accrued liability	46,289,331	33.00%	42,423,238	32.67%
10. Actuarially determined contribution, adjusted for timing*: (5) + (9)	50,929,734	36.31%	$45,253,238	34.85%
11. Projected payroll	$140,268,490		$129,855,576	

** Recommended contributions are assumed to be paid at the middle of every month.*

The actuarially determined contribution as of January 1, 2018, is based on all of the data described in the previous sections, the actuarial assumptions described in Section 4, and the Plan provisions adopted at the time of preparation of the Actuarial Valuation. They include all changes affecting future costs, adopted benefit changes, actuarial gains and losses and changes in the actuarial assumptions.

The chart reconciles the actuarially determined contribution from the prior valuation to the amount determined in this valuation.

CHART 14

Reconciliation of Actuarially Determined Contribution from January 1, 2017 to January 1, 2018

Actuarially Determined Contribution as of January 1, 2017	$45,253,238
Effect of the remainder of the Public Act being declared unconstitutional	3,034,041
Effect of expected change in amortization payment due to payroll growth	1,166,639
Effect of change in administrative expense assumption	152,118
Effect of change in other actuarial assumptions	0
Effect of contributions less than recommended contribution	1,709,523
Effect of investment gains	-623,229
Effect of other gains and losses on accrued liability	210,831
Effect of net other changes	26,573
Total change	$5,676,496
Actuarially Determined Contribution as of January 1, 2018	$50,929,734

EXHIBIT A

Table of Fund Coverage

Category	December 31 2017	December 31 2016	Change From Prior Year
Active members in valuation:			
Number	3,543	3,114	13.8%
Average age	41.0	41.3	-0.3
Average years of service	9.8	11.2	-1.4
Total salary supplied by the Fund	$134,258,328	$124,502,908	7.8%
Average salary	$37,894	$39,982	-5.2%
Total active vested members with at least 10 years of service	1,352	1,457	-7.2%
Vested terminated members	150	149	0.0%
Non-vested terminated members eligible for a return of contributions	4,148	4,070	1.9%
Service retirees:			
Number in pay status	2,115	2,113	0.1%
Average age	72.1	72.0	0.1
Average monthly benefit	$2,366	$2,318	2.1%
Beneficiaries (including children) in pay status:			
Number in pay status	761	757	0.5%
Average age	77.9	77.8	0.1
Average monthly benefit	$1,317	$1,280	2.9%
Total number of members	10,717	10,203	5.0%

EXHIBIT B

Participants in Active Service as of December 31, 2017
By Age, Years of Service, and Average Payroll

		Years of Service								
Age	Total	0-4	5-9	10-14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 & over
Under 25	501	487	14	- -	- -	- -	- -	- -	- -	- -
	$20,277	$20,142	$24,968	- -	- -	- -	- -	- -	- -	- -
25 - 29	536	386	131	19	- -	- -	- -	- -	- -	- -
	26,655	24,860	30,829	$34,324	- -	- -	- -	- -	- -	- -
30 - 34	423	196	99	110	18	- -	- -	- -	- -	- -
	34,424	28,711	40,838	36,941	$45,963	- -	- -	- -	- -	- -
35 - 39	323	138	54	64	61	6	- -	- -	- -	- -
	40,636	31,301	48,173	46,732	46,838	$59,444	- -	- -	- -	- -
40 - 44	323	129	50	58	47	35	4	- -	- -	- -
	43,817	30,771	50,396	53,279	56,449	47,985	$60,215	- -	- -	- -
45 - 49	382	112	47	75	72	50	26	- -	- -	- -
	45,543	33,522	51,143	45,061	46,073	57,406	64,314	- -	- -	- -
50 - 54	369	81	36	57	77	53	39	26	- -	- -
	47,680	31,177	40,929	42,648	50,651	61,355	58,297	$66,880	- -	- -
55 - 59	340	63	27	55	72	50	39	23	11	- -
	48,459	29,216	33,560	42,877	52,071	54,521	66,802	67,370	$67,377	- -
60 - 64	208	36	20	32	47	24	22	12	12	3
	47,988	25,713	45,835	48,562	50,652	51,126	58,877	58,183	63,736	$73,038
65 - 69	101	11	6	19	19	19	17	4	4	2
	48,208	36,736	33,648	40,685	49,644	44,177	70,529	57,733	56,995	24,754
70 & over	37	2	4	4	8	3	7	4	2	3
	44,732	22,983	29,970	20,290	46,810	61,608	46,277	62,411	57,489	53,405
Total	3,543	1,641	488	493	421	240	154	69	29	8
	$37,894	$26,093	$40,111	$43,354	$49,887	$54,731	$62,403	$64,742	$63,756	$53,604

EXHIBIT C

History of Active Member Valuation Data

Actuarial Valuation Date	Active Members	Percent Increase	Annual Salaries	Percent Increase	Average Salary	Percent Increase
06/30/2009	2,865	(5.48%)	$108,882,742	(2.52%)	$38,004	3.13%
06/30/2010	2,816	(1.71%)	107,361,021	(1.40%)	38,125	0.32%
06/30/2011	2,795	(0.75%)	107,686,693	0.30%	38,528	1.06%
06/30/2012	2,977	6.51%	109,798,508	1.96%	36,882	(4.27%)
12/31/2012	3,053	2.55%	113,934,756*	3.77%	37,319	1.18%
12/31/2013	3,076	0.75%	115,617,428	1.48%	37,587	0.72%
12/31/2014	2,973	(3.35%)	120,376,477	4.12%	40,490	7.72%
12/31/2015	3,063	3.03%	126,294,812	4.92%	41,232	1.83%
12/31/2016	3,114	1.67%	124,502,908	(1.42%)	39,982	(3.03%)
12/31/2017	3,543	13.78%	134,258,328	7.84%	37,894	(5.22%)
Average Increase/(Decrease) Last 5 years		3.18%		3.39%		0.40%
Last 10 years		1.66%		1.96%		0.29%

* *Annualized for short plan year.*

EXHIBIT D

Reconciliation of Member Data

	Active Members	Inactive Members	Retirees	Beneficiaries	Total
Number as of December 31, 2016	3,114	4,219	2,113	757	10,203
New participants	796	N/A	N/A	N/A	796
Terminations	(173)	173	0	0	0
Retirements	(57)	(41)	98	N/A	0
New disabilities	0	0	N/A	N/A	0
Died with beneficiary	(3)	0	(45)	48	0
Died without beneficiary	0	(4)	(51)	(44)	(99)
Refunds	(143)	(30)	0	0	(173)
Rehire	14	(14)	0	N/A	0
Certain period expired	N/A	N/A	0	0	0
Data adjustments	(5)	(5)	0	0	(10)
Number as of December 31, 2017	3,543	4,298	2,115	761	10,717

EXHIBIT E

Schedule of Pensioners and Beneficiaries Added to and Removed from Rolls

	Added to Rolls		Removed from Rolls		Rolls – End of Year			
Fiscal Year	Number	Annual Allowances	Number	Annual Allowances	Number*	Annual Allowances	% Increase in Avg. Annual Allowances	Average Annual Allowances
2009	137	$4,920,931	136	$2,637,590	2,996	$60,651,180	3.9	$20,244
2010	113	3,442,389	167	2,903,979	2,942	61,189,590	2.7	20,799
2011	124	3,735,377	167	2,828,495	2,899	62,096,472	3.0	21,420
6/2012	167	4,681,195	158	2,797,326	2,908	63,980,341	2.7	22,001
12/2012	71	2,470,960	91**	1,290,060	2,888	65,161,241	2.6	22,563
12/2013	147	4,594,883	147	2,788,285	2,888	66,967,839	2.8	23,188
12/2014	126	4,085,581	138	2,781,597	2,876	68,271,823	2.4	23,738
12/2015	94	1,823,238	106	2,271,591	2,864	67,823,470	-0.7	23,681
12/2016	126	5,283,834	133	2,711,190	2,857	70,396,114	4.0	24,640
12/2017	107	3,628,199	104	1,952,677	2,860	72,071,636	2.3	25,200

* *Does not include child beneficiaries receiving a pension.*

** *Includes removal of 17 QILDROs for participant count purposes.*

EXHIBIT F

Summary Statement of Income and Expenses on a Fair value Basis at Fiscal Year Ended December 31

	2017		2016	
Net position at fair value at the beginning of the year		$391,698,922		$393,155,338
Contribution income:				
Employer contributions	$20,920,614		$30,890,241	
Employee contributions	13,675,292		12,246,115	
Less administrative expenses	-1,682,136		-1,537,699	
Net contribution income		32,913,770		41,598,657
Securities lending income		88,011		101,963
Other income		3,768		609
Investment income:				
Interest, dividends and other income	$13,095,788		$13,790,816	
Asset appreciation	39,842,188		19,318,920	
Less investment and administrative fees	-1,855,662		-2,189,505	
Net investment income		51,082,314		30,920,231
Total income available for benefits		$84,087,863		$72,621,460
Less benefit payments:				
Annuity payments	-$71,756,876		-$71,029,420	
Disability & death	-495,464		-538,963	
Refund of contributions	-2,025,805		-2,509,493	
Refund of excess contributions	-3,859,882			
Net benefit payments		-$78,138,027		-$74,077,876
Change in reserve for future benefits		$5,949,836		-$1,456,416
Net position at fair value at the end of the year		$397,648,758		$391,698,922

EXHIBIT G

Summary Statement of Fund Assets at Fiscal Year Ended December 31

	2017		2016	
Accounts receivable		$23,268,082		$30,191,222
Investments, at fair value:				
Collective investment funds	$108,036,902		$82,280,329	
Risk parity	10,388,615		11,685,176	
Bonds	65,382,838		63,255,564	
Common and preferred stocks	56,254,103		58,654,400	
Real estate	36,104,891		38,382,589	
Private equity partnerships	22,366,679		30,480,102	
Hedged equity	25,160,062		12,107,984	
Infrastructure	23,328,660		22,043,799	
Mutual funds	20,340,559		15,327,740	
Foreign common stocks	--		16,522,290	
Short-term investments	8,939,984		7,721,867	
Total investments at fair value		376,303,293		358,461,840
Invested securities lending collateral		33,992,926		36,306,598
Prepaid annuity benefits		4,777,637		4,616,935
Furniture and fixtures, net		110,539		79,541
Prepaid expenses		75,503		68,278
Total assets		$438,527,980		$429,724,414
Less accounts payable:				
Accounts payable	-$489,443		-$501,064	
Accrued benefits and member contributions payable	-4,567,550		-565,033	
Securities lending collateral	-33,992,926		-36,306,598	
Due to broker	-1,766,195		-581,718	
Deferred rent	-63,108		-71,079	
Total accounts payable		-$40,879,222		-$38,025,492
Net position at fair value		$397,648,758		$391,698,922
Net position at actuarial value		$385,419,506		$393,604,997

EXHIBIT H

Development of the Fund Through December 31, 2017

Fiscal Year Ended	Employer Contributions	Employee Contributions	Net Investment Return*	Administrative Expenses	Benefit Payments	Actuarial Value of Assets at End of Year
June 30, 2009	$9,667,765	$10,141,146	$11,549,827	$1,335,180	$62,945,073	$553,754,517
June 30, 2010	10,829,339	9,829,998	8,194,551	1,465,562	62,560,242	518,582,601
June 30, 2011	10,981,419	9,791,650	15,218,630	1,498,905	63,704,890	489,370,505
June 30, 2012	10,868,361	10,404,827	-2,804,426	1,644,603	65,502,658	440,692,006
December 31, 2012	5,268,363	5,371,084	4,121,362	723,802	33,281,012	421,448,001
December 31, 2013	15,707,814	10,732,730	26,107,300	1,367,443	68,335,967	404,292,435
December 31, 2014	11,225,438	10,831,434	39,408,258	1,458,831	70,536,042	393,762,692
December 31, 2015	30,588,976	12,368,636	31,067,518	1,533,700	70,602,016	395,652,106
December 31, 2016	30,890,241	12,246,115	30,432,110	1,537,699	74,077,876	393,604,997
December 31, 2017	20,920,614	13,675,292	37,038,766	1,682,136	78,138,027	385,419,506

* *On an actuarial basis, net of investment fees, and includes other income.*

EXHIBIT I

Development of Unfunded Actuarial Accrued Liability

	Plan Year Ended December 31			
	2017		2016	
1. Unfunded actuarial accrued liability at beginning of year		$611,888,096		$514,608,254
2. Normal cost (including administrative expenses) at beginning of year		15,850,168		15,321,986
3. Total contributions		34,595,906		43,136,356
4. Interest				
(a) Unfunded actuarial accrued liability and normal cost	$47,080,370		$39,744,768	
(b) Total contributions	1,173,707		1,463,452	
(c) Total interest: (4a) – (4b)		45,906,663		38,281,316
5. Expected unfunded actuarial accrued liability: (1) + (2) – (3) + (4c)		$639,049,021		$525,075,200
6. Changes due to (gain)/loss from:				
(a) Investments	-$9,210,392		-$1,975,541	
(b) Demographics and other	3,115,773		-4,791,273	
(c) Total changes due to (gain)/loss: (6a) + (6b)		-$6,094,619		-$6,766,814
7. Change due to reinstating 3% post-retirement increases for Tier 1 members		0		93,579,710
8. Change due to remaining portions of Public Act 098-0622 being declared unconstitutional		20,905,536		0
9. Unfunded accrued liability at end of year: (5) + (6c) + (7) + (8)		$653,859,938		$611,888,096

EXHIBIT J
Definitions of Pension Terms

The following list defines certain technical terms for the convenience of the reader:

Actuarial Accrued Liability For Actives:	The equivalent of the accumulated normal costs allocated to the years before the valuation date.
Actuarial Accrued Liability For Pensioners:	The single-sum value of lifetime benefits to existing pensioners. This sum takes account of life expectancies appropriate to the ages of the pensioners and the interest that the sum is expected to earn before it is entirely paid out in benefits.
Actuarial Cost Method:	A procedure allocating the Actuarial Present Value of Future Benefits to various time periods; a method used to determine the Normal Cost and the Actuarial Accrued Liability that are used to determine the actuarially determined contribution.
Actuarial Gain or Actuarial Loss:	A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two Actuarial Valuation dates. Through the actuarial assumptions, rates of decrements, rates of salary increases, and rates of fund earnings have been forecasted. To the extent that actual experience differs from that assumed, Actuarial Accrued Liabilities emerge which may be the same as forecasted, or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., the Fund's assets earn more than projected, salary increases are less than assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results yield in actuarial liabilities that are larger than projected. Actuarial gains will shorten the time required for funding of the actuarial balance sheet deficiency while actuarial losses will lengthen the funding period.

Actuarially Equivalent: Of equal actuarial present value, determined as of a given date and based on a given set of Actuarial Assumptions.

Actuarial Present Value (APV): The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions. Each such amount or series of amounts is:

a. Adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.)
b. Multiplied by the probability of the occurrence of an event (such as survival, death, disability, termination of employment, etc.) on which the payment is conditioned, and
c. Discounted according to an assumed rate (or rates) of return to reflect the time value of money.

Actuarial Present Value of Future Plan Benefits: The Actuarial Present Value of benefit amounts expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age, anticipated future compensation, and future service credits. The Actuarial Present Value of Future Plan Benefits includes the liabilities for active members, retired members, beneficiaries receiving benefits, and inactive members entitled to either a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would be provide sufficient assets to pay all projected benefits and expenses when due.

Actuarial Valuation: The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan. An Actuarial Valuation for a governmental retirement system typically also includes calculations of items needed for compliance with GASB, such as the Actuarially Determined Contribution (ADC) and the Net Pension Liability (NPL).

Actuarial Value of Assets: The value of the Fund’s assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets, but commonly plans use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the ADC.

Actuarially Determined: Values that have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the law.

Actuarially Determined Contribution (ADC): The employer's periodic required contributions, expressed as a dollar amount or a percentage of covered plan compensation, determined under the Fund's funding policy. The ADC consists of the Employer Normal Cost and the Amortization Payment.

Amortization Method: A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization Payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.

Amortization Payment: The portion of the pension plan contribution, or ADC, that is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.

Assumptions or Actuarial Assumptions: The estimates on which the cost of the Fund is calculated including:

(a) Investment return - the rate of investment yield that the Fund will earn over the long-term future;

(b) Mortality rates - the death rates of employees and pensioners; life expectancy is based on these rates;

(c) Retirement rates - the rate or probability of retirement at a given age;

(d) Turnover rates - the rates at which employees of various ages are expected to leave employment for reasons other than death, disability, or retirement;

(e) Salary increase rates - the rates of salary increase due to inflation and productivity growth.

Closed Amortization Period:	A specific number of years that is counted down by one each year, and therefore declines to zero with the passage of time. For example, if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc. See Open Amortization Period.
Decrements:	Those causes/events due to which a member’s status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or termination.
Defined Benefit Plan:	A retirement plan in which benefits are defined by a formula applied to the member’s compensation and/or years of service.
Defined Contribution Plan:	A retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457 plan, in which the contributions to the plan are assigned to an account for each member, the plan’s earnings are allocated to each account, and each member’s benefits are a direct function of the account balance.
Employer Normal Cost:	The portion of the Normal Cost to be paid by the employers. This is equal to the Normal Cost less expected member contributions.
Experience Study:	A periodic review and analysis of the actual experience of the Fund that may lead to a revision of one or more actuarial assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified as deemed appropriate by the Actuary.
Funded Ratio:	The ratio of the actuarial value of assets (AVA) to the actuarial accrued liability (AAL). Plans sometimes calculate a market funded ratio, using the fair value of assets (MVA), rather than the AVA.

GASB: Governmental Accounting Standards Board.

GASB 67 and GASB 68: Governmental Accounting Standards Board Statements No. 67 and No. 68. These are the governmental accounting standards that set the accounting rules for public retirement systems and the employers that sponsor or contribute to them. Statement No. 68 sets the accounting rules for the employers that sponsor or contribute to public retirement systems, while Statement No. 67 sets the rules for the systems themselves.

Investment Return: The rate of earnings of the Fund from its investments, including interest, dividends and capital gain and loss adjustments, computed as a percentage of the average value of the fund. For actuarial purposes, the investment return often reflects a smoothing of the capital gains and losses to avoid significant swings in the value of assets from one year to the next.

Net Pension Liability (NPL): The Net Pension Liability is equal to the Total Pension Liability minus the Plan Fiduciary Net Position.

Normal Cost: That portion of the Actuarial Present Value of pension plan benefits and expenses allocated to a valuation year by the Actuarial Cost Method. Any payment in respect of an Unfunded Actuarial Accrued Liability is not part of Normal Cost (see Amortization Payment). For pension plan benefits that are provided in part by employee contributions, Normal Cost refers to the total of employee contributions and employer Normal Cost unless otherwise specifically stated.

Open Amortization Period: An open amortization period is one which is used to determine the Amortization Payment but which does not change over time. If the initial period is set as 30 years, the same 30-year period is used in determining the Amortization Period each year. In theory, if an Open Amortization Period with level percentage of payroll is used to amortize the Unfunded Actuarial Accrued Liability, the UAAL will never decrease, but will become smaller each year, in relation to covered payroll, if the actuarial assumptions are realized.

Plan Fiduciary Net Position:	Fair value of assets.
Total Pension Liability (TPL):	The actuarially accrued liability under the entry age normal cost method and based on the blended discount rate as described in GASB 67 and 68.
Unfunded Actuarial Accrued Liability:	The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets. This value may be negative in which case it may be expressed as a negative Unfunded Actuarial Accrued Liability, also called the Funding Surplus.
Valuation Date or Actuarial Valuation Date:	The date as of which the value of assets is determined and as of which the Actuarial Present Value of Future Plan Benefits is determined. The expected benefits to be paid in the future are discounted to this date.

EXHIBIT I

Summary of Actuarial Valuation Results

The valuation was made with respect to the following data supplied to us:			
1.	Pensioners as of the valuation date (including 745 beneficiaries and 16 dependent children)		2,876
2.	Members inactive as of the valuation date with vested rights		150
3.	Members active as of the valuation date		3,543
	Fully vested	1,352	
	Not vested	2,191	
4.	Other non-vested inactive members as of the valuation date		4,148
The actuarial factors as of the valuation date are as follows:			
1.	Employer normal cost, including administrative expenses		$4,640,403
2.	Actuarial accrued liability		1,039,279,444
	Retirees and beneficiaries	$706,084,520	
	Inactive members with vested rights	22,674,453	
	Active members	310,520,471	
3.	Actuarial value of assets ($397,648,758 at fair value)		385,419,506
4.	Unfunded actuarial accrued liability		$653,859,938
5.	Funded ratio: (3) ÷ (2)		37.1%

EXHIBIT I (continued)

Summary of Actuarial Valuation Results

The determination of the actuarially determined contribution is as follows:

1.	Total normal cost	$15,544,766
2.	Administrative expenses	1,709,027
3.	Expected employee contributions	-12,777,222
4.	Employer normal cost: (1) + (2) + (3)	$4,476,571
5.	Employer normal cost projected, adjusted for timing	4,640,403
6.	Payment on projected unfunded/(overfunded) actuarial accrued liability, adjusted for timing	46,289,331
7.	Total actuarially determined contribution: (5) + (6)	$50,929,734
8.	Estimated employer contributions provided by the Fund, reflecting 3% loss on collections	$12,798,291
9.	Projected payroll	140,268,490
10.	Total actuarially determined contribution as a percentage of projected payroll: (7) ÷ (9)	36.31%

EXHIBIT II

Comparison of Employer Contribution to Actuarially Determined Contribution

Fiscal Year Ended	Actuarially Determined Contribution (ADC)*	Actual Contributions	Percentage Contributed
June 30, 2009	$18,285,474	$9,667,765	52.9%
June 30, 2010	22,399,740	10,829,339	48.3%
June 30, 2011	25,319,145	10,981,419	43.4%
June 30, 2012	28,051,528	10,868,361	38.7%
December 31, 2012	16,786,671	5,268,636	31.4%
December 31, 2013	41,834,857	15,707,814	37.5%
December 31, 2014	35,307,186	11,225,438	31.8%
December 31, 2015	36,273,994	30,588,976	84.3%
December 31, 2016	37,130,268	30,890,241	83.2%
December 31, 2017	45,253,238	20,920,614	46.2%
December 31, 2018	50,929,734	- -	- -

**Prior to 2015, this amount was the Annual Required Contribution (ARC)*

EXHIBIT III

Schedule of Funding Progress

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded/ (Overfunded) AAL (UAAL) (b) - (a)	Funded Ratio (a) / (b)	Covered Payroll (c)	UAAL as a Percentage of Covered Payroll* [(b) - (a)] / (c)
06/30/2009	$553,754,517	$823,896,936	$270,142,419	67.21%	$108,882,742	248.10%
06/30/2010	518,582,601	833,025,948	314,443,347	62.25%	107,361,021	292.88%
06/30/2011	489,370,505	843,943,240	354,572,735	57.99%	107,686,693	329.26%
06/30/2012	440,692,006	866,370,565	425,678,559	50.87%	114,223,909	372.67%
12/31/2012	421,448,001	971,807,222	550,359,221	43.37%	58,231,511	472.56%**
12/31/2013	404,292,435	888,023,364	483,730,929	45.53%	117,781,596	410.70%
12/31/2014	393,762,692	900,840,617	507,077,925	43.71%	118,987,507	426.16%
12/31/2015	395,652,106	910,260,360	514,608,254	43.47%	122,382,584	420.49%
12/31/2016	393,604,997	1,005,493,093	611,888,096	39.15%	121,126,918	505.16%
12/31/2017	385,419,506	1,039,279,444	653,859,938	37.09%	135,315,008	483.21%

* *Not less than zero*
** *Adjusted for annualized covered payroll*

EXHIBIT IV

Solvency Test at December 31

	12/31/2017	12/31/2016	12/31/2015	12/31/2014	12/31/2013	12/31/2012
1. Actuarial accrued liability (AAL)						
a. Active member contributions	$173,903,043	$172,808,623	$173,241,768	$169,952,178	$171,065,449	$166,554,660
b. Retirees and beneficiaries	706,084,520	694,881,116	625,396,307	625,641,580	621,827,982	662,153,615
c. Active and inactive members (employer financed)	159,291,881	137,803,354	111,622,285	105,246,859	95,129,933	143,098,947
d. Total	1,039,279,444	1,005,493,093	$910,260,360	$900,840,617	$888,023,364	$971,807,222
2. Actuarial value of assets	385,419,506	393,604,997	395,652,106	393,762,692	404,292,435	421,448,001
3. Cumulative portion of AAL covered						
a. Active member contribution	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
b. Retirees and beneficiaries	30.0%	31.8%	35.6%	35.8%	37.5%	38.5%
c. Active and inactive members (employer financed)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

EXHIBIT V

Projection of Contributions, Liabilities, and Assets

Based on the results of the December 31, 2017, actuarial valuation, we have projected valuation results for a 40-year period commencing with Fiscal Year 2018.

For purposes of the projections, all assets, contributions, and benefit payments have been included. Our projections of contributions, liabilities, and assets are based on the actuarial assumptions, membership data and benefit provisions that were used for the regular actuarial valuation.

In order to determine projected contributions, liabilities, and assets, certain calculations needed to be made that are not normally required in a regular actuarial valuation. Benefit payout requirements, actuarial liabilities, and payroll were estimated over the 40-year period from 2018 through 2056 by projecting the membership of the Fund over the 40-year period, taking into account the impact of new entrants into the Fund over the 40-year period.

To make the required projections, assumptions needed to be made regarding the age and salary distribution of new entrants as well as the size of the active membership of the Fund. The assumptions regarding the profile of new entrants to the Fund were based on the recent experience of the Fund with regard to new entrants. The size of the active membership of the Fund was assumed to remain constant over the 40-year projection period. The results of our projections are shown on the following pages.

For purposes of this projection, we have assumed that all available assets, including accumulated contributions made by existing active members, will be used to pay benefits until insolvency; at that point, request for refund of contributions from terminating active members will be treated as benefit payments that must be funded by employer contributions. However, the legality of this situation is undetermined at this time, and if it is determined that the reserve for accumulated active member contributions cannot be paid to existing annuitants, the Fund would become insolvent earlier than 2027.

The fair value of assets is assumed to earn the assumption of 7.5% each year of the projection until the projected date of insolvency. In reality, as the insolvency date approaches, invested assets will likely be rebalanced into more liquid, lower return assets in order to pay the benefits that are due. To the extent that actual returns are less than the 7.5% assumption as a result of this rebalancing, the Fund would become insolvent earlier than 2027.

EXHIBIT V (continued)

Projection of Contributions, Liabilities, and Assets

Fiscal Year	Employee Contributions	Employer Contributions	Payroll	Normal Cost	Benefit Payouts	Estimated Expenses	Total Actuarial Liability	Actuarial Value of Assets	Unfunded Actuarial Liability	Funded Ratio
2017							1,039,279.4	385,419.5	653,859.9	37.1%
2018	12,777.2	12,798.3	140,268.5	15,544.8	77,879.7	1,766.2	1,053,135.8	359,511.9	693,623.9	34.1%
2019	12,571.3	14,604.7	137,981.0	15,244.9	78,821.0	1,854.6	1,066,732.4	332,608.0	734,124.4	31.2%
2020	12,442.8	13,645.6	136,552.7	15,058.3	79,811.0	1,947.3	1,080,121.1	305,506.6	774,614.6	28.3%
2021	12,336.3	13,425.7	135,369.1	14,896.3	80,745.1	2,044.6	1,093,370.6	274,544.0	818,826.6	25.1%
2022	12,260.8	13,288.4	134,530.3	14,766.1	81,620.9	2,146.9	1,106,565.3	235,375.9	871,189.5	21.3%
2023	12,206.6	13,174.7	133,928.7	14,653.3	82,674.8	2,254.2	1,119,534.9	191,720.9	927,814.1	17.1%
2024	12,162.7	13,094.0	133,440.5	14,522.1	83,766.2	2,366.9	1,132,203.8	143,242.3	988,961.5	12.7%
2025	12,132.6	13,036.2	133,105.5	14,403.8	84,887.8	2,485.3	1,144,532.1	89,586.5	1,054,945.6	7.8%
2026	12,110.8	12,989.3	132,864.0	14,267.8	86,053.4	2,609.5	1,156,429.4	30,404.7	1,126,024.7	2.6%
2027	12,079.3	47,589.0	132,513.4	14,098.5	87,333.0	2,740.0	1,167,709.5	0.0	1,167,709.5	0.0%
2028	12,052.8	79,401.7	132,219.2	13,947.5	88,577.5	2,877.0	1,178,382.2	0.0	1,178,382.2	0.0%
2029	12,030.6	80,957.8	131,972.9	13,791.9	89,967.5	3,020.9	1,188,245.8	0.0	1,188,245.8	0.0%
2030	12,027.7	82,573.5	131,940.7	13,656.4	91,429.3	3,171.9	1,197,187.0	0.0	1,197,187.0	0.0%
2031	12,022.8	84,200.6	131,886.1	13,509.4	92,892.9	3,330.5	1,205,122.2	0.0	1,205,122.2	0.0%
2032	12,024.7	85,666.3	131,907.2	13,356.0	94,194.0	3,497.0	1,212,137.9	0.0	1,212,137.9	0.0%
2033	12,046.6	87,027.3	132,151.0	13,229.8	95,402.1	3,671.9	1,218,290.7	0.0	1,218,290.7	0.0%
2034	12,088.7	88,409.2	132,618.2	13,121.4	96,642.4	3,855.5	1,223,501.4	0.0	1,223,501.4	0.0%
2035	12,122.7	89,429.3	132,995.9	12,983.9	97,503.7	4,048.3	1,228,061.7	0.0	1,228,061.7	0.0%
2036	12,190.0	90,650.2	133,743.4	12,893.5	98,589.5	4,250.7	1,231,740.2	0.0	1,231,740.2	0.0%
2037	12,240.6	89,326.6	134,305.5	12,762.1	97,103.9	4,463.2	1,237,094.6	0.0	1,237,094.6	0.0%
2038	12,310.8	90,108.2	135,086.2	12,652.3	97,732.6	4,686.4	1,242,080.3	0.0	1,242,080.3	0.0%
2039	12,398.3	90,606.6	136,058.1	12,560.6	98,084.2	4,920.7	1,246,976.5	0.0	1,246,976.5	0.0%
2040	12,503.8	90,802.4	137,230.5	12,487.3	98,139.4	5,166.7	1,252,104.0	0.0	1,252,104.0	0.0%
2041	12,630.7	90,818.5	138,640.6	12,448.0	98,024.2	5,425.1	1,257,693.3	0.0	1,257,693.3	0.0%
2042	12,771.6	90,528.3	140,205.5	12,424.0	97,603.5	5,696.3	1,264,112.5	0.0	1,264,112.5	0.0%
2043	12,932.9	89,874.5	141,997.9	12,434.2	96,826.2	5,981.1	1,271,830.4	0.0	1,271,830.4	0.0%
2044	13,123.9	89,068.6	144,120.9	12,483.5	95,912.4	6,280.2	1,281,128.4	0.0	1,281,128.4	0.0%
2045	13,330.4	87,993.7	146,415.1	12,563.6	94,729.9	6,594.2	1,292,436.6	0.0	1,292,436.6	0.0%
2046	13,561.6	86,749.7	148,983.3	12,676.2	93,387.3	6,923.9	1,306,106.9	0.0	1,306,106.9	0.0%
2047	13,811.1	85,548.0	151,755.6	12,816.1	92,088.9	7,270.1	1,322,300.0	0.0	1,322,300.0	0.0%
2048	14,067.7	84,326.4	154,606.6	12,968.4	90,760.5	7,633.6	1,341,249.5	0.0	1,341,249.5	0.0%

EXHIBIT V (continued)

Projection of Contributions, Liabilities, and Assets

Fiscal Year	Employee Contributions	Employer Contributions	Payroll	Normal Cost	Benefit Payouts	Estimated Expenses	Total Actuarial Liability	Actuarial Value of Assets	Unfunded Actuarial Liability	Funded Ratio
2049	14,341.4	83,267.2	157,648.6	13,142.4	89,593.3	8,015.3	1,363,018.2	0.0	1,363,018.2	0.0%
2050	14,617.1	82,142.1	160,711.5	13,318.1	88,343.1	8,416.0	1,387,905.5	0.0	1,387,905.5	0.0%
2051	14,911.7	81,089.7	163,984.4	13,508.3	87,164.5	8,836.8	1,416,086.6	0.0	1,416,086.6	0.0%
2052	15,224.0	80,240.2	167,455.0	13,725.5	86,185.5	9,278.7	1,447,630.6	0.0	1,447,630.6	0.0%
2053	15,542.4	79,431.6	170,992.3	13,938.9	85,231.3	9,742.6	1,482,759.7	0.0	1,482,759.7	0.0%
2054	15,876.5	79,058.8	174,705.2	14,174.1	84,705.6	10,229.8	1,521,321.8	0.0	1,521,321.8	0.0%
2055	16,219.4	78,659.2	178,514.9	14,415.9	84,137.4	10,741.2	1,563,625.5	0.0	1,563,625.5	0.0%
2056	16,586.0	78,286.1	182,588.3	14,680.8	83,593.8	11,278.3	1,609,950.6	0.0	1,609,950.6	0.0%

EXHIBIT VI

Actuarial Assumptions and Actuarial Cost Method

Rationale for Assumptions:

The information and analysis used in supporting each assumption that has a significant effect on this actuarial valuation is shown in the Experience Review dated April 15, 2013. Current data is reviewed in conjunction with each annual valuation.

Mortality Rates:

The RP-2000 Combined Healthy Mortality Table, set forward 1 year for female participants with generational projection from 2003 using Scale AA (adopted December 31, 2012).

The mortality table specified above was determined to contain provision appropriate to reasonably reflect future mortality improvement, based on a review of mortality experience as of the measurement date.

Termination:

Select and ultimate termination rates are based on recent experience of the Fund (adopted December 31, 2012). Ultimate rates applicable for members with eight or more years of service are shown for sample ages in the table on the next page. Select rates are as follows:

Years of Service	Rate (%)
0 - 0.99	15.0
1 - 1.99	13.5
2 - 2.99	12.0
3 - 3.99	11.0
4 - 4.99	10.0
5 - 5.99	9.0
6 - 6.99	8.5
7 - 7.99	8.0

Ultimate rates:

Age	Rate (%)
20	7.0
25	7.0
30	6.0
35	5.0
40	3.5
45	3.3
50	3.0
55	3.0

Retirement Rates:

For employees first hired prior to January 1, 2011, rates of retirement for each age from 50 to 75 based on the recent experience of the Fund were used (adopted December 31, 2012). Sample rates are shown below.

	Rate (%)	
Age	<30 Years of Service	30+ Years of Service
50	5.0	40.0
55	5.0	20.0
60	6.0	6.0
65	12.0	12.0
70	14.0	14.0
75	100.0	100.0

For employees first hired on or after January 1, 2011, rates of retirement for each age from 62 to 75 were used (adopted June 30, 2011; revised December 31, 2013). Sample rates are shown below.

Age	Rate (%)
62	50.0
65	20.0
67	50.0
70	20.0
75	100.0

Salary Increases:

Assumed salary increases are based on the recent experience of the Fund were used (adopted December 31, 2012). Rates are shown below.

Years of Service	Rate (%)
0 - 0.99	15.00
1 - 1.99	7.50
2 - 2.99	3.75
3 - 3.99	3.25
4+	2.75

Valuation of Inactive Vested Participants:

The liability for an inactive member is equal to his or her existing account balance, or, if the participant has at least 10 years of service, twice the existing account balance.

Unknown Data for Participants:

Same as those exhibited by participants with similar known characteristics. If not specified, participants are assumed to be male.

Spouses:

75% of participants were assumed to be married and females are assumed to be 2 years younger than males.

Disability Benefit Valuation:

Disability benefits are valued in normal cost by annualizing the actual monthly disability payment amounts for the month prior to the valuation date.

Investment Return:	7.50% per year, net of investment expenses (adopted December 31, 2012)
Inflation:	2.75% per year (adopted December 31, 2012)
Payroll Growth:	2.75% per year (adopted December 31, 2012)
Administrative Expenses:	Equal to actual expenses for the prior year, increased by 5%.
Actuarial Value of Assets:	The actuarial value of assets was determined by smoothing unexpected gains and losses over a period of 5 years. The gain or loss for a year is calculated as the total investment income on the fair value of assets, minus expected investment return on the prior actuarial value of assets. The final actuarial value is equal to the expected actuarial value plus (or minus) 20% of the calculated gain (or loss) in the prior 5 years.
Actuarial Cost Method:	Entry Age Normal (adopted December 31, 2012). Under this method, a normal cost is calculated for each employee that is the level annual contribution as a percent of pay required to be made from the employee's date of hire for as long as he/she remains active so that sufficient assets will be accumulated to provide his/her benefit. The accrued liability is the difference between the present value of all future benefits and the present value of all future normal costs.

EXHIBIT VII

Summary of Plan Provisions

This exhibit summarizes the major provisions of the Fund included in the valuation. It is not intended to be, nor should it be interpreted as, a complete statement of all plan provisions.

Membership:	Any person employed by the Chicago Park District in a position requiring service for 6 months or more in a calendar year is required to become a member of the Fund as a condition of employment.
Employee Contributions:	All members of the Fund are required to contribute 9% of salary to the Fund as follows: 7% for the retirement pension, 1% for the spouse's pension, and 1% for the automatic increases in the retirement pension. In addition, employees are required to contribute $3.60 per month toward the cost of the single sum death benefit.
Tiers:	Tier 1: First hired before January 1, 2011. Tier 2: First hired on or after January 1, 2011.
Retirement Pension:	a. Eligibility – An employee may retire at age 50 with at least 10 years of service or at age 60 with 4 years of service. If retirement occurs before age 60, the retirement pension is reduced ¼ of 1% of each month that the age of the member is below 60. However, there is no reduction if the employee has at least 30 years of service. b. Amount – The retirement pension is based on the average of the 4 highest consecutive years of salary within the last 10 years. For an employee who withdraws from service on or after December 31, 2003, the amount of the retirement pension is 2.4% of highest average salary for each year of service. The maximum pension payable is 80% of the highest annual salary.

	An employee who was a participant before July 1, 1971 is entitled to the pension provided under the money purchase formula if it provides a greater pension than that provided under the above fixed benefit formula. An employee who first becomes a participant on or after January 1, 2011 is subject to the following provisions: 1. The highest salary for annuity purposes is equal to the average monthly salary obtained by dividing the participant's total salary during the 96 consecutive months of service within the last 120 months of service in which the total compensation was the highest by the number of months in that period. 2. For 2018, the annual salary is limited to $113,644.91. Limitations for future years shall automatically be increased by the lesser of 3% or one-half the percentage change in the Consumer Price Index-U during the preceding calendar year. 3. A participant is eligible to retire with unreduced benefits after attainment of age 67 with at least 10 years of service credit. However, a participant may elect to retire at age 62 with at least 10 years of service credit and receive a retirement annuity reduced by ½ of 1% for each month that the age of the member is below 67.
Post-Retirement Increase:	An employee retiring at age 60 or over, or an employee with 30 or more years of service, is entitled to automatic annual increases of 3% of the originally granted pension following one year's receipt of pension payments. In the case of an employee with less than 30 years of service who retires before age 60, the increases begin following the later of attainment of age 60 and receipt of one year's pension payments. Automatic annual increases (AAI) in the retirement annuity for employees who first became a participant on or after January 1, 2011 are equal to the lesser of 3% or one-half the annual change in the Consumer Price Index-U, whichever is less, based on the originally granted retirement annuity.

Surviving Spouse's Pension:	A surviving spouse is entitled to a pension upon the death of an employee while in service or on retirement. If the surviving spouse is age 60 or over and the employee or retiree had at least 20 years of service, the minimum surviving spouse's pension is 50% of the deceased employee's or retired employee's pension at the date of death. If the age of the surviving spouse is less than 60, the pension is reduced ½ of 1% for each month the surviving spouse is under age 60. If the employee had less than 20 years of service, the surviving spouse is entitled to a pension under the money purchase formula, taking into account employee and employer contributions toward the surviving spouse's pension. Surviving spouse's pensions are subject to annual increases of 3% per year based on the current amount of pension. For employees who first become a participant on or after January 1, 2011, the initial survivor's annuity is equal to 66 2/3% of the participant's earned retirement annuity at the date of death, subject to automatic annual increases of the lesser of 3% or one-half of the increase in the Consumer Price Index-U during the preceding calendar year, based on the originally granted survivor's annuity.
Children's Pension:	Unmarried children of a deceased employee under the age of 18 are entitled to a children's pension. If either parent is living, the pension is $100.00 per month. If no parent survives, the pension for each child is $150.00 per month. The total amount payable to a spouse or children may not exceed 60% of the employee's final salary.
Single Sum Death Benefit:	A death benefit is payable upon the death of an employee in service in addition to any other benefits payable to the surviving spouse or minor children. The death benefit payable is as follows: $3,000 benefit during the first year of service, $4,000 benefit during the second year of service, $5,000 benefit during the third year of service, $6,000 benefit during the fourth through tenth year of service, and $10,000 benefit if death occurs after ten or more years of service.

	Upon the death of a retired member with ten or more years of service, the $10,000 maximum benefit is reduced to $6,000 if death occurs during the first year of retirement. Thereafter, it is reduced by $1,500 for each year or fraction of a year while on retirement, but shall not be less than $3,000.
Ordinary Disability Benefit:	An ordinary disability benefit is payable after eight consecutive days of absence for illness without pay. The amount of the benefit is 45% of salary. The benefit is payable for a period not to exceed ¼ of the length of service or five years, whichever is less.
Occupational Disability Benefit:	Upon disability resulting from an injury incurred while on duty, an employee is entitled to a disability benefit of 75% of salary from the first day of absence without pay. The benefit is payable during the period of disability until the employee attains age 65 if disability is incurred before age 60, or for a period of five years if disability is incurred after age 60.
Occupational Death Benefit:	Upon the death of an employee resulting from an accident incurred in the performance of duty, the surviving spouse is entitled to an occupational death benefit of 50% of salary. Each unmarried child under the age of 18 is entitled to a benefit of $100 per month. The combined payments to a family may not exceed 75% of the employee’s final salary. The total payments are reduced by Workmen’s Compensation benefits.

Refunds:	An employee who terminates employment before qualifying for a pension is entitled to a refund of employee contributions. The refund is payable to any employee who withdraws before age 55, regardless of the length of service. It is also payable to an employee who withdraws between age 55 and 60 with less than 10 years of service, and to an employee who withdraws after age 60 with less than 5 years of service. An employee who is unmarried at date of retirement is entitled to a refund of the full amount contributed for the spouse's pension, without interest.
Plan Year:	January 1 through December 31. Prior to December 31, 2012, the plan year was July 1 through June 30.
Employer Contributions:	The tax multiple is 1.1 for 2018 and thereafter.

EXHIBIT 1

Net Pension Liability

The components of the net pension liability of the Fund at December 31, 2017 were as follows:

Total pension liability	$1,624,571,524
Plan fiduciary net position	397,648,758
Net pension liability	1,226,922,766
Plan fiduciary net position as a percentage of the total pension liability	24.48%

Actuarial assumptions. The total pension liability was determined by an actuarial valuation as of December 31, 2017, using the following actuarial assumptions, applied to all periods included in the measurement:

Inflation	2.75%
Salary increases	Service-based ranging from 15% to 2.75%
Single equivalent discount rate	3.65%, net of pension plan investment expense, including inflation
Cost of living adjustments	3% of original benefit for employees who first became a participant before January 1, 2011; the lesser of 3% and 1/2 of CPI of original benefit for employees who first became a participant on or after January 1, 2011; beneficiary COLAs are 3% compounded.

For healthy members, mortality rates were based on the RP-2000 Combined Healthy Table, set forward 1 year for female participants, with generational projection from 2003 using Scale AA.

The actuarial assumptions used in the December 31, 2017, valuation were based on the results of an experience study for the period July 1, 2007 to June 30, 2012.

Discount rate: The discount rate used to measure the total pension liability was 3.65%. The projection of cash flows used to determine the discount rate assumed member contributions will be made at the 9% contribution rate for 2018 and thereafter. Employer contributions will be made at the 1.1 multiple of member contributions from two years prior for 2018 and thereafter. For this purpose, only employer contributions that are intended to fund benefits of current plan members and their beneficiaries are included. Projected employer contributions and contributions from future plan members that are intended to fund the service costs of future plan members and their beneficiaries are not included. Based on those assumptions, the pension plan's fiduciary net position was not projected to be available to make all projected future benefit payments of current plan members. The projected benefit payments through 2025 were discounted at the expected long-term rate of return (7.50%). Starting in 2026, the projected benefit payments were discounted at the municipal bond index (3.44%). Therefore, a single equivalent, blended discount rate of 3.65% was calculated using the long-term expected rate of return and the municipal bond index.

Sensitivity of the net pension liability to changes in the discount rate. The following presents the net pension liability of the Fund, calculated using the discount rate of 3.65%, as well as what the Fund's net pension liability would be if it were calculated using a discount rate that is 1-percentage-point lower (2.65%) or 1-percentage-point higher (4.65%) than the current rate:

	1% Decrease (2.65%)	Current Discount Rate (3.65%)	1% Increase (4.65%)
Net pension liability as of December 31, 2017	$1,466,351,862	$1,226,922,766	$1,031,461,240

EXHIBIT 2

Schedule of Changes in Net Pension Liability

	2017	2016
Total pension liability		
Service cost	$20,115,813	$13,763,768
Interest	68,982,467	66,523,889
Change of benefit term	36,183,940	93,579,710
Differences between expected and actual experience	2,785,815	-4,556,757
Changes of assumptions	370,422,560	198,725,863
Benefit payments, including refunds of employee contributions	-78,138,027	-74,077,877
Net change in total pension liability	420,352,568	293,958,596
Total pension liability – beginning	1,204,218,956	910,260,360
Total pension liability – ending (a)	1,624,571,524	1,204,218,956
Plan fiduciary net position		
Contributions – employer	20,920,614	30,890,241
Contributions – employee	13,675,292	12,246,115
Net investment income	51,082,314	30,920,231
Benefit payments, including refunds of employee contributions	-78,138,027	-74,077,877
Administrative expense	-1,682,136	-1,537,698
Other	91,779	102,572
Net change in plan fiduciary net position	5,949,836	-1,456,416
Plan fiduciary net position – beginning	391,698,922	393,155,338
Plan fiduciary net position – ending (b)	397,648,758	391,698,922
Fund’s net pension liability – ending (a) – (b)	1,226,922,766	812,520,034
Plan fiduciary net position as a percentage of the total pension liability	24.48%	32.53%
Covered employee payroll	$135,315,008	$121,126,918
Fund’s net pension liability as percentage of covered employee payroll	906.72%	670.80%

EXHIBIT 3

Schedule of Employer Contribution – Last Ten Fiscal Years

Fiscal Year Ended	Actuarially Determined Contributions	Contributions in Relation to the Actuarially Determined Contributions	Contribution Deficiency (Excess)	Covered-Employee Payroll	Contributions as a Percentage of Covered Employee Payroll
June 30, 2009	$18,285,474	$9,667,765	$8,617,709	$108,882,742	8.88%
June 30, 2010	22,399,740	10,829,339	11,570,401	107,361,021	10.09%
June 30, 2011	25,319,145	10,981,419	14,337,726	107,686,693	10.20%
June 30, 2012	28,051,528	10,868,361	17,183,167	114,223,909	9.51%
December 31, 2012	16,786,671	5,268,363	11,518,308	58,231,511	9.05%
December 31, 2013	41,834,857	15,707,814	26,127,043	117,781,596	13.34%
December 31, 2014	35,307,186	11,225,438	24,081,748	118,987,507	9.43%
December 31, 2015	36,273,994	30,588,976	5,685,018	122,382,584	24.99%
December 31, 2016	37,130,268	30,890,241	6,240,027	121,126,918	25.50%
December 31, 2017	45,253,238	20,920,614	24,332,624	135,315,008	15.46%

Notes to EXHIBIT 3

Valuation date	Actuarially determined contribution amount is determined as of December 31, with appropriate interest to the middle of the year.
Methods and assumptions used to establish "actuarially determined contribution" rates:	
Actuarial cost method	Entry Age Actuarial cost method
Amortization method	25-year closed, level percentage of payroll amortization
Asset valuation method	5-year smoothed market
Actuarial assumptions:	
Investment rate of return	7.50%, net of investment expense
Projected salary increases	Service-based ranging from 15% to 2.75%
Mortality	Post-retirement mortality rates were based on the RP-2000 Combined Healthy Mortality Tables set forward 1 year for females with generational projection from 2003 using scale AA for mortality improvements. Pre-retirement mortality rates are the same as post-retirement rates.
Cost of living adjustments	3% of original benefit for employees who first became a participant before January 1, 2011; the lesser of 3% and 1/2 of CPI of original benefit for employees who first became a participant on or after January 1, 2011; beneficiary COLAs are 3% compounded.
Other assumptions:	Same as those used in the December 31, 2017, actuarial funding valuations.

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