Park Employees' Annuity and Benefit Fund of Chicago

Actuarial Valuation and Review as of
December 31, 2019

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April 30, 2020

Board of Trustees
Park Employees' Annuity and Benefit Fund of Chicago
55 East Monroe Street, Suite 2720
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Dear Board Members:

We are pleased to submit this annual Actuarial Valuation and Review as of December 31, 2019. 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, 2020, 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

The plan provisions are unchanged since the last actuarial valuation.

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, 2019 actuarial valuation were based on an experience analysis covering the five-year period ending December 31, 2017 and were adopted by the Board, effective for the December 31, 2018 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, adopted by the Board, is to have contributions sufficient to amortize the unfunded liability over the 30-year period ending December 31, 2042. However, the actual amount of employer contributions each year is set by statute. For Fiscal 2020, actual 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 employer contributions 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 eight years (during 2027). Segal strongly recommends an actuarial funding method that targets 100% funding of the actuarial accrued liability. Generally, this implies payments that are ultimately at least enough to cover normal cost, interest on the unfunded actuarial accrued liability and 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, which were prepared by Segal:

- Actuarial
  - Active Member Valuation Data
  - Retirees and Beneficiaries Added to and Removed from Rolls
  - Solvency Test
  - Analysis of Financial Experience
- Financial
  - Schedule of Changes in Employer's Net Pension Liability
  - Schedule of Employer's Net Pension Liability
  - Schedule of Employer Contributions

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

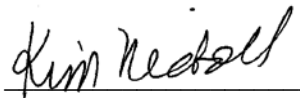
The actuarial calculations were directed under our supervision. We are members of the American Academy of Actuaries and we meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. To the best of our knowledge, the information supplied in the actuarial 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.

Sincerely,

Segal, a Member of The Segal Group, Inc.

By: 

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



Kim Nicholl, FSA, MAAA, EA, FCA
Senior Vice President and Actuary

SECTION 1

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SECTION 2

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SECTION 3

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SECTION 4

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SECTION 5

GASB INFORMATION

Purpose

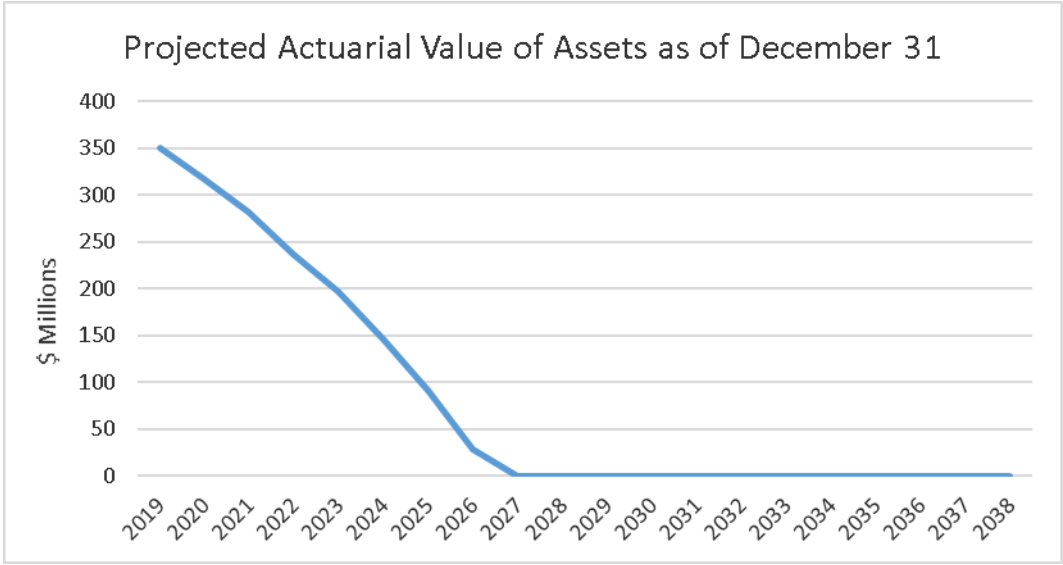
This report has been prepared by Segal to present a valuation of the Park Employees' Annuity and Benefit Fund of Chicago (the Fund) as of December 31, 2019. The valuation was performed to determine whether the assets and contributions are sufficient to provide the prescribed benefits. The contribution 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, 2019, provided by Fund staff;
- The assets of the Fund as of December 31, 2019, provided by Fund staff;
- Economic assumptions regarding future salary increases and investment earnings; and
- Other actuarial assumptions, regarding employee terminations, retirement, death, etc.

Valuation Highlights

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

1. **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.**



2. **The funding approach mandated by the Illinois Pension Code is inadequate. Segal strongly recommends an actuarial funding method that targets 100% funding of the actuarial accrued liability. Generally, this implies payments that are ultimately at least enough to cover normal cost, interest on the unfunded actuarial accrued liability and the principal balance.**
3. The funded ratio based on the actuarial value of assets over the actuarial accrued liability as of December 31, 2019, is 29.9%, compared to 32.1% as of December 31, 2018. 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, 2019, is 30.3%, compared to 30.0% as of December 31, 2018. 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.

4. 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, 2020, the actuarially determined contribution amount (ADC) is $67,297,212. Based on the 1.1 tax multiple, and using the Fund's assumption of 3% loss on collections (the Park District has been absorbing this loss, however, the Park District is not guaranteed to do so in the future), we have estimated the employer contribution for the fiscal year beginning January 1, 2020, to be $12,757,896. **Compared to the ADC of $67,297,212, the contribution deficiency is $54,539,316 as of January 1, 2020. In the prior fiscal year, actual contributions were $34,205,701 less than the ADC. Each year of a contribution deficiency leads to an increased deficiency in all future years.**
5. In 2019, in addition to the contributions required by 40 ILCS 5/12-149, the employer made a supplemental contribution of $13.1 million to the Fund, for total employer contributions of $27.7 million. For 2020, in addition to the contributions required by 40 ILCS 5/12-149, the employer has budgeted a supplemental contribution of $20.6 million to the Fund.
6. For the year ended December 31, 2019, Segal has determined that the asset return on a fair value basis was 16.1%. After gradual recognition of investment gains and losses under the actuarial smoothing method, the actuarial rate of return was 6.6%. This represents an experience loss when compared to the assumed rate of 7.25%. As of December 31, 2019, the actuarial value of assets ($350.0 million) represents 98.7% of the fair value ($354.6 million).
7. The portion of deferred investment gains and losses recognized in the calculation of the December 31, 2019, actuarial value of assets resulted in a loss of $2,267,129. Additionally, the demographic and liability experience resulted in a $9,107,861 net loss.
8. The total unrecognized investment loss as of December 31, 2019, is $4,595,860. This investment loss 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 gains derived from future experience. This implies that earning the assumed rate of investment return of 7.25% per year (net of investment expenses) on a **fair value** basis will result in investment losses on the actuarial value of assets in the next few years. Therefore, if the actual fair value return is equal to the assumed 7.25% rate and all other actuarial assumptions are met, the contribution requirements would increase 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 98.7% of the fair value of assets as of December 31, 2019. 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) that is used for funding purposes is used to determine the total pension liability. However, as of December 31, 2019, the GASB blended discount rate calculation results in a lower discount rate (2.84%) than is used for funding purposes (7.25%). 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, 2019, is $1,691,529,042.
12. This actuarial report as of December 31, 2019, 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

	2020	2019
Contributions for fiscal year beginning:		
Actuarially determined contribution requirement	$67,297,212	$61,887,790
Estimated employer contributions (provided by the Fund, reflecting 3% loss on collections)	12,757,896	14,135,549
Actual employer contribution	--	27,682,089
Funding elements for fiscal year beginning:		
Employer normal cost, including administrative expenses	$6,457,619	$5,750,766
Fair value of assets	354,556,288	342,255,873
Actuarial value of assets	349,960,428	366,806,612
Actuarial accrued liability	1,170,602,980	1,142,297,965
Unfunded actuarial accrued liability	820,642,552	775,491,353
Funded ratio	29.90%	32.11%
GASB Information:		
Long-term expected rate of return	7.25%	7.25%
Municipal bond index	2.74%	4.10%
Single equivalent discount rate	2.84%	4.21%
Total pension liability	$2,046,085,330	$1,646,968,021
Plan fiduciary net position	354,556,288	342,255,873
Net pension liability	1,691,529,042	1,304,712,418
Plan fiduciary net position as a percentage of total pension liability	17.33%	20.78%
Demographic data for plan year beginning:		
Number of retired participants and beneficiaries	2,843	2,854
Number of vested former participants	147	145
Number of active participants	3,132	3,187
Total salary supplied by the Fund	$136,105,381	$129,923,175
Average salary	43,456	40,767

Important Information About Actuarial Valuations

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

In order to prepare a valuation, 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 a plan is based on data provided to the actuary by the 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 market value of assets as of the valuation date, as provided by the Fund staff. The Fund staff uses an "actuarial value of assets" that differs from market value to gradually reflect year-to-year changes in the market 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 participants 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 participant 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 plan'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 plan'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 plan will be determined by the actual benefits and expenses paid and the actual investment experience of the plan.
- 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: 2011 – 2019

Census Date	Active Members	Vested Terminated Members*	Retirees and Beneficiaries**	Ratio of Actives to Retirees and Beneficiaries
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
December 31, 2018	3,187	145	2,854	1.12
December 31, 2019	3,132	147	2,843	1.05

* *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 3,132 active members with an average age of 41.8, average years of service of 10.0 years and average salary of $43,456. The 3,187 active participants in the prior valuation had an average age of 41.5, average years of service of 9.9 years and average salary of $40,767.

Inactive Participants

In this year's valuation, there were 147 members with a vested right to a deferred or immediate vested benefit.

In addition, there were 4,756 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, 2019

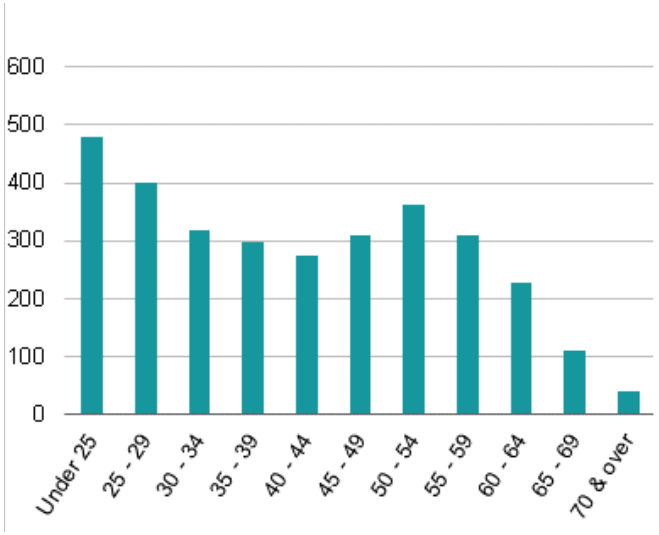
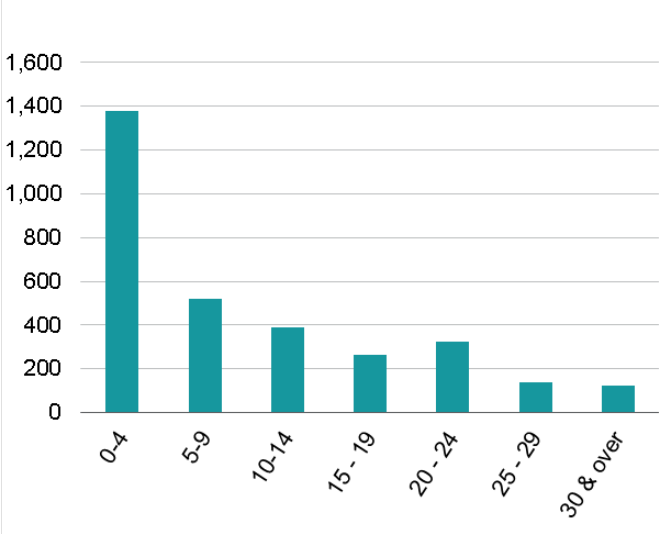


CHART 3

Distribution of Active Members by Years of Service as of December 31, 2019



Retirees and Beneficiaries

As of December 31, 2019, 2,144 retirees, 686 beneficiaries, and 13 dependent children were receiving total monthly benefits of $6,329,549. For comparison, in the previous valuation, there were 2,136 retirees, 706 beneficiaries, and 12 dependent children receiving monthly benefits of $6,192,223.

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, 2019

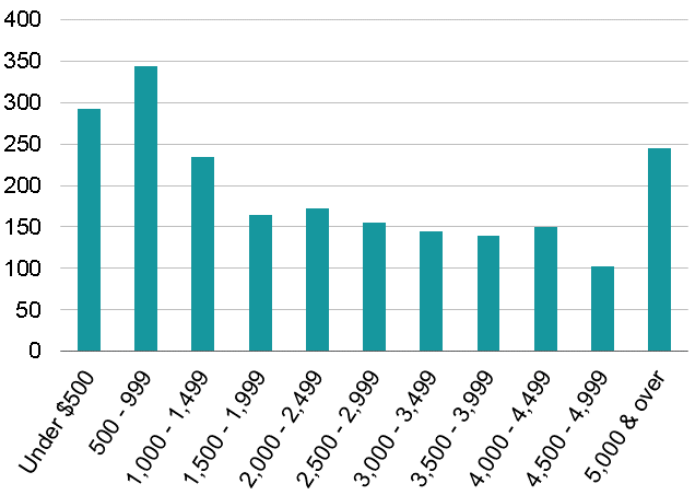
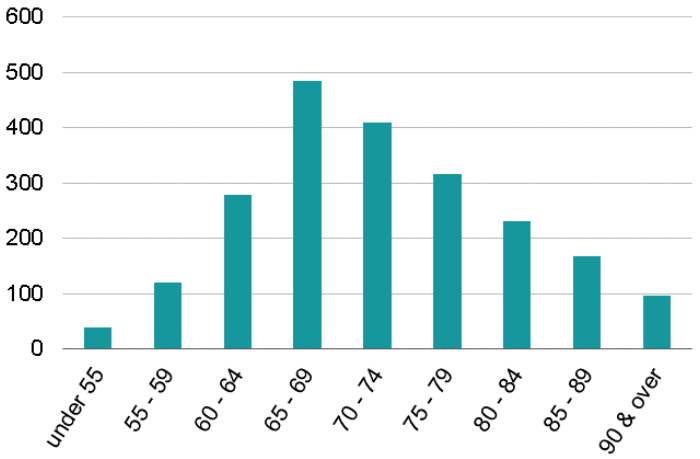


CHART 5

Distribution of Retirees by Age as of December 31, 2019



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

				2019		2018
1.	Actuarial value of assets as of prior valuation date			$366,806,612		$385,419,506
2.	Employer and employee contributions and other income			40,346,944		39,763,859
3.	Benefits and expenses			80,079,310		78,027,859
4.	Expected investment income			25,153,186		27,471,569
5.	Total investment income, including income for securities lending			52,032,656		-17,129,052
6.	Investment gain/(loss): (5) – (4)			26,879,470		-44,600,621
7.	Expected actuarial value of assets: (1) + (2) – (3) + (4)			352,227,557		374,627,243
8.	Calculation of unrecognized return	Original Amount*	% Recognized		% Recognized	
	(a) Year ended December 31, 2019	$26,879,470	20%	5,375,894	--	--
	(b) Year ended December 31, 2018	-44,600,621	20%	-8,920,124	20%	-8,920,124
	(c) Year ended December 31, 2017	23,345,719	20%	4,669,144	20%	4,669,144
	(d) Year ended December 31, 2016	2,566,234	20%	513,247	20%	513,247
	(e) Year ended December 31, 2015	-19,526,450	20%	-3,905,290	20%	-3,905,290
	(f) Year ended December 31, 2014	-888,039	0%	0	20%	-177,608
	(g) Total recognized return			-2,267,129		-7,820,631
9.	Actuarial value of assets as of current valuation date: (7) + (8g)			$349,960,428		$366,806,612

* *Total return minus expected return on actuarial value*

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.

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

CHART 7

Actuarial Value of Assets vs. Fair value of Assets as of June 30, 2011 – December 31, 2019

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 loss is $11,344,690; $2,267,129 from investment losses and $9,077,561 in losses from all other sources. The net experience variation from individual sources other than investments was 0.8% 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, 2019

1.	Net loss from investments*	($2,267,129)
2.	Net gain from administrative expenses	30,300
3.	Net loss from other experience**	(9,107,861)
4.	Net experience loss: (1) + (2) + (3)	($11,344,690)

* *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 for the year ended December 31, 2019 was 7.25%. The actual rate of return on an actuarial basis for the year ended December 31, 2019, was 6.60%.

Since the actual return for the year was less than the assumed return, the Fund experienced an actuarial loss during the fiscal year ended December 31, 2019, 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, 2019

1.	Actual return	$22,886,057
2.	Average value of assets	346,940,491
3.	Actual rate of return: (1) ÷ (2)	6.60%
4.	Assumed rate of return	7.25%
5.	Expected return: (2) x (4)	$25,153,186
6.	Actuarial loss: (1) – (5)	($2,267,129)

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, 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	14.2%**	10.0%*
December 31, 2018	-5.1%**	5.4%*
December 31, 2019	17.0%**	6.6%*
Average Returns		
Last 5 valuation years:	7.0%	7.6%
Last 10 valuation years:	9.0%	6.1%

* *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.

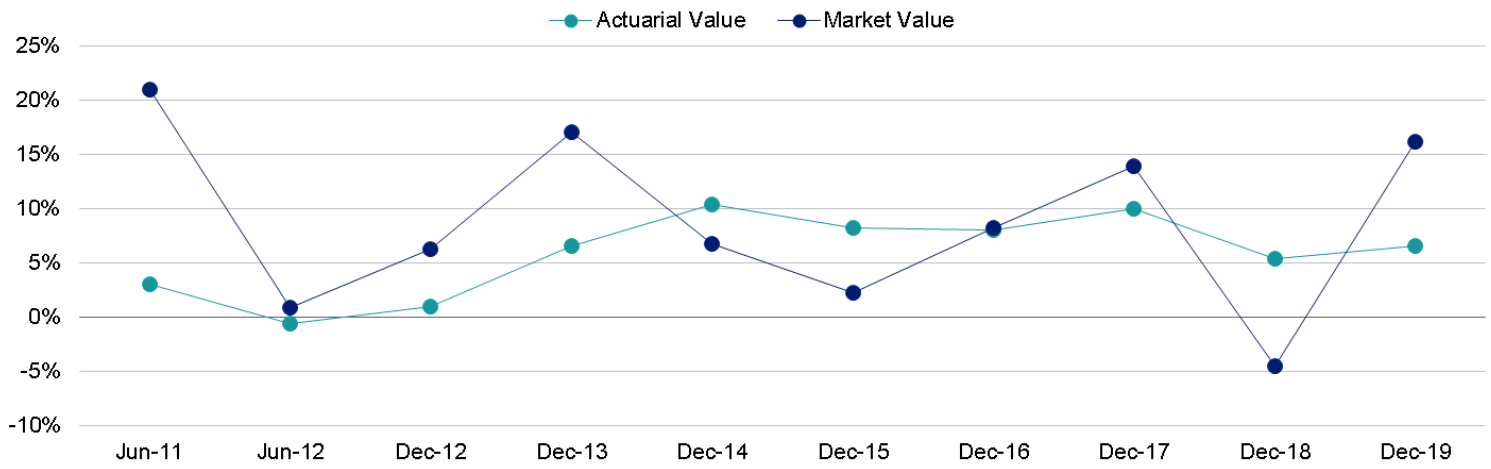
Administrative Expenses

Administrative expenses for the year ended December 31, 2019 totaled $1,528,861 compared to the assumption of $1,504,833. This resulted in a gain of $30,300 for the year when adjusted for timing.

This chart illustrates how this leveling effect has actually worked over the years 2011 - 2019.

CHART 11

Fair and Actuarial Rates of Return for Years Ended June 30, 2011 – December 31, 2019



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, 2019, amounted to $9,107,861, which is 0.8% of the actuarial accrued liability.

A brief summary of the demographic gain/(loss) experience of the Fund for the year ended December 31, 2019 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, 2019

1. Turnover	-$3,357,600
2. Retirement	-2,030,016
3. Experience among retired members and beneficiaries related to mortality	4,163,599
4. Salary/service increase for continuing actives	-5,919,254
5. Other	-1,964,590
6. Total	-$9,107,861

D. DEVELOPMENT OF EMPLOYER COSTS

At the discretion of the Board, the actuarial valuation includes the calculation of a funding policy benchmark contribution amount referred to as the actuarially determined contribution. 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 47.37% of payroll.

The actuarially determined contribution is calculated on a level percentage of pay basis and is based on a closed 30-year period, which ends on December 31, 2042. As of January 1, 2020, there are 23 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			
	2020		2019	
	Amount	% of Payroll	Amount	% of Payroll
1. Total normal cost	$17,626,255	12.41%	$16,447,693	12.07%
2. Administrative expenses	1,532,725	1.08%	1,504,833	1.10%
3. Expected employee contributions	-12,922,180	-9.10%	-12,398,408	-9.10%
4. Employer normal cost: (1) + (2) + (3)	6,236,800	4.39%	5,554,118	4.08%
5. Employer normal cost, adjusted for timing*	6,457,619	4.55%	5,750,767	4.22%
6. Actuarial accrued liability	1,170,602,980		1,142,297,965	
7. Actuarial value of assets	349,960,428		366,806,612	
8. Unfunded actuarial accrued liability: (6) - (7)	820,642,552		775,491,353	
9. Payment on unfunded actuarial accrued liability	60,839,593	42.82%	56,137,023	41.21%
10. Actuarially determined contribution, adjusted for timing*: (5) + (9)	67,297,212	47.37%	61,887,790	45.43%
11. Projected payroll	$142,076,419		$136,230,328	

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

The actuarially determined contribution as of January 1, 2020, 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, 2019 to January 1, 2020

Actuarially Determined Contribution as of January 1, 2019	$61,887,790
Effect of expected change in amortization payment due to payroll growth	1,403,425
Effect of change in administrative expense assumption	28,880
Effect of change in other actuarial assumptions	0
Effect of contributions less than recommended contribution	2,531,691
Effect of investment losses	160,633
Effect of other gains and losses on accrued liability	643,173
Effect of net other changes	641,620
Total change	$5,409,422
Actuarially Determined Contribution as of January 1, 2020	$67,297,212

E. RISK

Since the actuarial valuation results are dependent on a given set of assumptions and data as of a specific date, there is a risk that emerging results may differ significantly as actual experience differs from the assumptions.

This report does not contain a detailed analysis of the potential range of future measurements, but does include a brief discussion of some risks that may affect the Fund. Upon request, a more detailed assessment of the risks can be provided to enable a better understanding of the risks specific to this Fund.

Investment Risk

Since the Plan's assets are much larger than contributions, investment performance may create significant volatility in contribution requirements. For example, if the actual return on the market value of assets for the next Plan Year were 1% different from the assumed (either higher or lower), the projected unfunded actuarial liability would change by 0.1%, or about $0.8 million and the actuarially determined contribution requirements would increase or decrease by approximately $0.06 million.

The market value rate of return over the last 10 years has ranged from a low of -5.1% to a high of 21.0%, with an average of 9.0%.

A market value rate of return of 1.3% during 2020 would move projected insolvency into 2026.

Longevity Risk

The actuarial valuation includes an expectation of future improvement in life expectancy. Emerging plan experience that does not match these expectations will result in either an increase or decrease in the Plan's funding policy and actuarially determined contribution requirement.

Contribution Risk

The Plan's funding policy contribution requires payment of the Employer's normal cost and an amortization payment according to a schedule sufficient to pay down unfunded actuarial liability over time. If the Plan's funding policy contribution were adhered to, contribution risk would be negligible.

However, Plan contributions are set by statute. The statutorily-required amount systematically underfunds the Plan. For Fiscal 2020, actual 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 tax multiple.

If contributions remain at current level and future experience matches the current assumptions, we project the unfunded actuarial accrued liability will not be paid off and the Fund will become insolvent.

Demographic Risk

Examples of this risk include:

- Actual retirements occurring earlier or later than assumed. The value of retirement plan benefits is sensitive to the rate of benefit accruals and any early retirement subsidies that apply.
- More or less active participant turnover than assumed.
- Individual salary increases higher or lower than assumed.

Actual Experience Over the Last 10 years and Implications for the Future

Past experience can help demonstrate the sensitivity of key results to the Plan's actual experience. Over the past ten years:

- The investment gain/(loss) for a year has ranged from a gain of $45 million to a loss of $44 million.
- The non-investment gain/(loss) for a year has ranged from a gain of $5 million to a loss of $9 million.
- The funded percentage on the actuarial value of assets has ranged from a low of 29.90% to a high of 62.25%.

EXHIBIT A

Table of Fund Coverage

Category	December 31 2019	December 31 2018	Change From Prior Year
Active members in valuation:			
Number	3,132	3,187	-1.7%
Average age	41.8	41.5	+0.3
Average years of service	10.0	9.9	+0.1
Total salary provided by the Fund	$136,105,381	$129,923,175	4.8%
Average salary	$43,456	$40,767	+6.6%
Total active vested members with at least 10 years of service	1,264	1,271	-0.6%
Vested terminated members	147	145	1.4%
Non-vested terminated members eligible for a return of contributions	4,756	4,634	+2.6%
Service retirees:			
Number in pay status	2,144	2,136	+0.4%
Average age	72.3	72.2	+0.1
Average monthly benefit	$2,484	$2,441	+1.8%
Beneficiaries (including children) in pay status:			
Number in pay status	699	718	-2.6%
Average age	78.1	78.0	+0.1
Average monthly benefit	$1,403	$1,364	+2.9%
Total number of members	10,878	10,820	+0.5%

EXHIBIT B

Participants in Active Service as of December 31, 2019
By Age, Years of Service, and Average Payroll provided by the Fund

	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	479	473	6	-	-	-	-	-	-	-
	$19,056	$18,910	$30,535	-	-	-	-	-	-	-
25 – 29	401	269	125	7	-	-	-	-	-	-
	31,655	29,401	35,883	$42,753	-	-	-	-	-	-
30 – 34	318	134	110	66	8	-	-	-	-	-
	40,454	35,158	47,044	38,991	$50,630	-	-	-	-	-
35 – 39	298	103	53	71	59	12	-	-	-	-
	49,345	42,409	53,655	53,230	52,062	$53,510	-	-	-	-
40 – 44	275	99	59	49	23	41	4	-	-	-
	52,631	33,711	71,796	54,161	68,443	58,980	$63,513	-	-	-
45 – 49	309	91	42	55	36	59	26	-	-	-
	56,018	38,781	59,418	57,830	76,137	63,211	62,839	-	-	-
50 – 54	361	76	37	52	59	70	46	20	1	-
	52,112	32,615	47,703	46,874	56,797	63,571	63,552	$65,846	$89,917	-
55 – 59	310	72	41	35	31	69	25	30	6	1
	53,638	39,768	42,953	42,682	62,850	57,006	78,424	72,582	74,236	$44,224
60 – 64	229	42	29	30	32	39	22	14	15	6
	50,616	32,256	47,808	43,639	52,452	55,974	58,670	60,795	75,762	66,853
65 – 69	111	18	10	18	13	23	11	12	2	4
	54,849	38,738	31,373	50,825	53,547	59,133	86,805	65,817	52,099	64,331
70 & over	41	1	7	4	4	11	3	3	4	4
	44,197	16,690	19,505	39,582	54,693	51,624	43,712	61,196	52,467	47,330
Total	3,132	1,378	519	387	265	324	137	79	28	15
	$43,456	$29,180	$47,748	$48,579	$59,187	$59,519	$66,778	$67,328	$70,922	$59,466

EXHIBIT C

History of Active Member Valuation Data

Actuarial Valuation Date	Active Members	Percent Increase	Annual Salaries	Percent Increase	Average Salary	Percent Increase
06/30/2011	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%)
12/31/2018	3,187	(10.05%)	129,923,175	(3.23%)	40,767	7.58%
12/31/2019	3,132	(1.73%)	136,105,381	4.76%	43,456	6.60%
Average Increase/(Decrease) Last 5 years		1.34%		2.57%		1.55%
Last 10 years		1.24%		2.45%		1.42%

* *Annualized for short plan year.*

EXHIBIT D

Reconciliation of Member Data

	Active Members	Inactive Members	Retirees	Beneficiaries	Total
Number as of December 31, 2018	3,187	4,779	2,136	718	10,820
New participants	320	N/A	N/A	N/A	320
Terminations	(201)	201	-	-	-
Retirements	(61)	(32)	93	N/A	-
New disabilities	-	-	N/A	N/A	-
Died with beneficiary	(1)	-	(37)	38	-
Died without beneficiary	(1)	(1)	(48)	(57)	(107)
Refunds	(132)	(33)	-	-	(165)
Rehire	21	(21)	-	-	-
Data adjustments	-	10	-	-	10
Number as of December 31, 2019	3,132	4,903	2,144	699	10,878

EXHIBIT E

Schedule of Pensioners and Beneficiaries Added to and Removed from Rolls

Fiscal Year	Added to Rolls		Removed from Rolls		Rolls – End of Year		% Increase in Avg. Annual Allowances	Average Annual Allowances
	Number	Annual Allowances	Number	Annual Allowances	Number*	Annual Allowances		
6/2011	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
12/2018	135	5,446,939	153	2,967,901	2,842	74,550,674	4.1	26,232
12/2019	128	4,578,087	140	$3,174,168	2,830	75,954,593	2.3	26,839

* *Does not include child beneficiaries receiving a pension.*
** *Includes removal of 20 QILDROs for participant count purposes.*

EXHIBIT F

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

	2019		2018	
Net position at fair value at the beginning of the year		$342,255,873		$397,648,758
Contribution income:				
Employer contributions	$27,682,089		$27,638,402	
Employee contributions	12,664,855		12,125,457	
Less administrative expenses	-1,528,861		-1,501,039	
Net contribution income		38,818,083		38,262,820
Securities lending income		50,111		67,760
Other income		125		167
Investment income:				
Interest, dividends and other income	$6,785,122		$12,194,461	
Asset appreciation	46,929,814		-27,559,554	
Less investment and administrative fees	-1,732,391		-1,831,719	
Net investment income		51,982,545		-17,196,812
Total income available for benefits		$90,850,864		$21,133,935
Less benefit payments:				
Annuity payments	-$75,850,465		-$73,303,464	
Disability & death	-615,546		-497,389	
Refund of contributions	-2,084,438		-2,725,967	
Refund of excess contributions	0		0	
Net benefit payments		-$78,550,449		-$76,526,820
Change in reserve for future benefits		$12,300,415		-$55,392,885
Net position at fair value at the end of the year		$354,556,288		$342,255,873

EXHIBIT G

Summary Statement of Fund Assets at Fiscal Year Ended December 31

	2019		2018	
Accounts receivable		$15,987,449		$16,127,092
Investments, at fair value:				
Collective investment funds	$81,295,724		$72,315,985	
Risk parity	0		1,348,182	
Bonds	59,247,177		61,043,992	
Common and preferred stocks	43,787,794		45,332,504	
Real estate	37,047,140		37,225,201	
Private equity partnerships	18,031,007		19,232,200	
Hedged equity	24,807,129		24,437,510	
Infrastructure	24,353,479		22,774,008	
Mutual funds	19,208,421		15,420,085	
International equity	21,776,682		18,093,650	
Short-term investments	4,784,370		6,181,608	
Total investments at fair value		334,338,923		323,404,925
Invested securities lending collateral		19,769,592		24,113,674
Prepaid annuity benefits		5,252,036		5,061,599
Furniture and fixtures, net		145,461		138,555
Prepaid expenses		53,866		80,359
Total assets		$375,547,327		$368,926,204
Less accounts payable:				
Accounts payable	-$348,273		-$418,365	
Accrued benefits and member contributions payable	-568,215		-588,867	
Securities lending collateral	-19,769,592		-24,113,674	
Due to broker	-257,794		-1,494,289	
Deferred rent	-47,165		-55,136	
Total accounts payable		-$20,991,039		-$26,670,331
Net position at fair value		$354,556,288		$342,255,873
Net position at actuarial value		$349,960,428		$366,806,612

EXHIBIT H

Development of the Fund Through December 31, 2019

Fiscal Year Ended	Employer Contributions	Employee Contributions	Net Investment Return*	Administrative Expenses	Benefit Payments	Actuarial Value of Assets at End of Year
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
December 31, 2018	27,638,402	12,125,457	19,651,105	1,501,039	76,526,820	366,806,612
December 31, 2019	27,682,089	12,664,855	22,886,182	1,528,861	78,550,449	349,960,428

* *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			
	2019		2018	
1. Unfunded actuarial accrued liability at beginning of year		$775,491,353		$653,859,938
2. Normal cost (including administrative expenses) at beginning of year		17,952,526		17,253,792
3. Total contributions		40,346,944		39,763,859
4. Interest				
(a) Unfunded actuarial accrued liability and normal cost	$57,524,681		$50,333,530	
(b) Total contributions	1,323,754		1,349,035	
(c) Total interest: (4a) – (4b)		56,200,927		48,984,495
5. Expected unfunded actuarial accrued liability: (1) + (2) – (3) + (4c)		$809,297,862		$680,334,366
6. Changes due to (gain)/loss from:				
(a) Investments	$2,267,129		$7,820,631	
(b) Demographics and other	9,077,561		3,354,696	
(c) Total changes due to (gain)/loss: (6a) + (6b)		$11,344,690		$11,175,327
7. Assumption changes		0		83,981,660
8. Unfunded accrued liability at end of year: (5) + (6c) + (7)		$820,642,552		$775,491,353

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 686 beneficiaries and 13 dependent children)		2,843
2.	Members inactive as of the valuation date with vested rights		147
3.	Members active as of the valuation date		3,132
	Fully vested	1,264	
	Not vested	1,868	
4.	Other non-vested inactive members as of the valuation date		4,756
The actuarial factors as of the valuation date are as follows:			
1.	Employer normal cost, including administrative expenses		$6,236,800
2.	Actuarial accrued liability		1,170,602,980
	Retirees and beneficiaries	$789,231,586	
	Inactive members with vested rights	23,490,893	
	Active members	357,880,501	
3.	Actuarial value of assets ($354,556,288 at fair value)		349,960,428
4.	Unfunded actuarial accrued liability: (2) – (3)		$820,642,552
5.	Funded ratio: (3) ÷ (2)		29.9%

EXHIBIT I (continued)

Actuarially Determined Contribution Split by Tier

		Total		Tier I		Tier II	
		Amount	% of Payroll	Amount	% of Payroll	Amount	% of Payroll
1.	Total normal cost	$17,626,255	12.41%	$12,348,845	14.24%	$4,450,384	8.99%
2.	Administrative expenses*	1,532,725	1.08%	1,514,430	1.75%	18,295	0.02%
3.	Expected employee contributions	-12,922,180	-9.10%	-7,872,843	-9.08%	-4,523,189	-9.14%
4.	Employer normal cost: (1) + (2) + (3)	$6,236,800	4.39%	$5,990,432	6.91%	-$54,510	-0.11%
5.	Employer normal cost, adjusted for timing**	6,457,620	4.55%	6,202,528	7.15%	-56,440	-0.11%
6.	Actuarial accrued liability	1,170,602,980		1,156,630,636		13,972,344	
7.	Actuarial value of assets	349,960,428					
8.	Unfunded actuarial accrued liability: (6) - (7)	820,642,552					
9.	Payment on unfunded actuarial accrued liability	60,839,593	42.82%				
10.	Actuarially determined contribution, adjusted for timing**: (5) + (9)	$67,297,212	47.37%				
11.	Estimated employer contributions provided by the Fund, reflecting 3% loss on collections***	$12,757,896					
12.	Projected payroll	142,076,419		86,715,716		49,514,612	

** Administrative expenses are split by % of accrued liability.*
*** Recommended contributions are assumed to be paid at the middle of every month.*
**** The Park District has been absorbing the 3% loss on collections, however, the Park District is not guaranteed to do so in the future.*

EXHIBIT II

Comparison of Employer Contribution to Actuarially Determined Contribution

Fiscal Year Ended	Actuarially Determined Contribution (ADC)*	Actual Contributions	Percentage Contributed
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	27,638,402	54.3%
December 31, 2019	61,887,790	27,682,089	44.7%
December 31, 2020	67,297,212	- -	- -

**Prior to 2015, this amount was referred to as 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)
06/30/2011	$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%
12/31/2018	366,806,612	1,142,297,965	775,491,353	32.11%	133,112,100	582.59%
12/31/2019	349,960,428	1,170,602,980	820,642,552	29.90%	139,204,051	589.52%

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

EXHIBIT IV

Solvency Test at December 31

	12/31/2019	12/31/2018	12/31/2017	12/31/2016	12/31/2015	12/31/2014
1. Actuarial accrued liability (AAL)						
a. Active member contributions	$173,843,745	$164,316,381	$173,903,043	$172,808,623	$173,241,768	$169,952,178
b. Retirees and beneficiaries	789,231,586	778,565,525	706,084,520	694,881,116	625,396,307	625,641,580
c. Active and inactive members (employer financed)	207,527,649	199,416,059	159,291,881	137,803,354	111,622,285	105,246,859
d. Total	$1,170,602,980	$1,142,297,965	$1,039,279,444	$1,005,493,093	$910,260,360	$900,840,617
2. Actuarial value of assets	349,960,428	366,806,612	385,419,506	393,604,997	395,652,106	393,762,692
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	22.3%	26.0%	30.0%	31.8%	35.6%	35.8%
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, 2019, actuarial valuation, we have projected valuation results for a 40-year period commencing with Fiscal Year 2020.

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 2020 through 2058 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 7.25% 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 7.25% 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
2019							$1,170,603.0	$349,960.4	$820,642.6	29.9%
2020	$12,922.2	$12,757.9	$142,076.4	$17,626.3	$81,582.0	$1,582.4	1,189,836.5	317,469.4	872,367.1	26.7%
2021	12,727.3	13,513.4	139,911.4	17,380.9	82,724.0	1,637.8	1,209,018.0	281,496.4	927,521.6	23.3%
2022	12,636.0	13,788.0	138,896.8	17,255.5	83,917.7	1,695.1	1,228,218.7	237,171.9	991,046.7	19.3%
2023	12,567.4	13,580.1	138,134.0	17,129.8	85,274.4	1,754.4	1,247,270.6	196,883.8	1,050,386.8	15.8%
2024	12,523.0	13,482.6	137,640.7	16,955.5	86,729.6	1,815.8	1,266,009.0	146,589.0	1,119,420.0	11.6%
2025	12,492.7	13,409.4	137,304.6	16,786.9	88,268.3	1,879.4	1,284,330.5	90,819.2	1,193,511.2	7.1%
2026	12,470.4	13,362.0	137,056.9	16,610.9	89,835.5	1,945.1	1,302,167.5	29,198.8	1,272,968.8	2.2%
2027	12,445.6	51,904.8	136,780.6	16,397.4	91,535.9	2,013.2	1,319,306.8	0.0	1,319,306.8	0.0%
2028	12,428.8	83,055.2	136,594.5	16,202.8	93,400.3	2,083.7	1,335,548.0	0.0	1,335,548.0	0.0%
2029	12,409.4	84,950.7	136,379.1	15,878.8	95,203.6	2,156.6	1,350,750.5	0.0	1,350,750.5	0.0%
2030	12,401.7	86,963.0	136,293.5	15,698.8	97,132.6	2,232.1	1,364,863.2	0.0	1,364,863.2	0.0%
2031	12,396.5	89,010.7	136,235.0	15,515.8	99,096.9	2,310.2	1,377,767.3	0.0	1,377,767.3	0.0%
2032	12,399.1	90,931.9	136,264.8	15,313.9	100,940.0	2,391.1	1,389,480.5	0.0	1,389,480.5	0.0%
2033	12,415.2	92,766.3	136,442.8	15,115.3	102,706.7	2,474.8	1,399,999.1	0.0	1,399,999.1	0.0%
2034	12,446.2	94,613.7	136,788.2	14,921.3	104,498.6	2,561.4	1,409,215.5	0.0	1,409,215.5	0.0%
2035	12,474.7	96,122.8	137,104.1	14,721.1	105,946.4	2,651.0	1,417,385.0	0.0	1,417,385.0	0.0%
2036	12,530.0	97,790.6	137,719.2	14,548.7	107,576.8	2,743.8	1,424,272.5	0.0	1,424,272.5	0.0%
2037	12,569.6	96,909.8	138,159.1	14,355.1	106,639.6	2,839.8	1,432,422.8	0.0	1,432,422.8	0.0%
2038	12,629.5	98,168.6	138,824.6	14,176.5	107,858.9	2,939.2	1,439,708.9	0.0	1,439,708.9	0.0%
2039	12,695.9	99,043.2	139,561.6	14,004.8	108,696.9	3,042.1	1,446,470.8	0.0	1,446,470.8	0.0%
2040	12,788.7	99,687.4	140,593.7	13,867.6	109,327.5	3,148.6	1,452,922.3	0.0	1,452,922.3	0.0%
2041	12,894.7	100,071.6	141,771.0	13,744.9	109,707.5	3,258.8	1,459,316.1	0.0	1,459,316.1	0.0%
2042	13,023.8	100,117.5	143,205.2	13,676.3	109,768.4	3,372.8	1,466,036.9	0.0	1,466,036.9	0.0%
2043	13,173.7	99,771.9	144,870.8	13,608.9	109,454.6	3,490.9	1,473,497.7	0.0	1,473,497.7	0.0%
2044	13,348.2	99,178.1	146,809.9	13,600.1	108,913.2	3,613.1	1,482,051.1	0.0	1,482,051.1	0.0%
2045	13,540.4	98,210.5	148,945.0	13,624.6	108,011.3	3,739.5	1,492,185.5	0.0	1,492,185.5	0.0%
2046	13,760.7	97,148.8	151,393.2	13,691.2	107,039.1	3,870.4	1,504,133.6	0.0	1,504,133.6	0.0%
2047	13,990.5	96,022.6	153,946.3	13,789.2	106,007.2	4,005.9	1,518,122.3	0.0	1,518,122.3	0.0%

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
2048	$14,230.4	$94,818.8	$156,612.5	$13,906.5	$104,903.1	$4,146.1	$1,534,395.0	$0.0	$1,534,395.0	0.0%
2049	14,484.5	93,533.3	159,435.5	14,044.1	103,726.6	4,291.2	1,553,214.2	0.0	1,553,214.2	0.0%
2050	14,746.5	91,920.8	162,346.7	14,201.3	102,226.0	4,441.4	1,575,121.5	0.0	1,575,121.5	0.0%
2051	15,037.8	90,549.2	165,583.8	14,400.6	100,990.2	4,596.8	1,600,111.3	0.0	1,600,111.3	0.0%
2052	15,332.3	89,323.2	168,855.2	14,616.2	99,897.7	4,757.7	1,628,276.2	0.0	1,628,276.2	0.0%
2053	15,628.7	88,101.2	172,149.3	14,841.5	98,805.7	4,924.2	1,659,856.4	0.0	1,659,856.4	0.0%
2054	15,941.3	86,801.5	175,622.1	15,081.0	97,646.2	5,096.6	1,695,184.4	0.0	1,695,184.4	0.0%
2055	16,271.1	85,408.5	179,286.5	15,341.2	96,404.6	5,275.0	1,734,639.4	0.0	1,734,639.4	0.0%
2056	16,619.8	84,322.0	183,161.4	15,639.6	95,482.3	5,459.6	1,778,230.8	0.0	1,778,230.8	0.0%
2057	16,980.4	83,061.2	187,167.2	15,952.4	94,390.9	5,650.7	1,826,448.9	0.0	1,826,448.9	0.0%
2058	17,364.4	82,009.0	191,434.4	16,304.5	93,524.9	5,848.5	1,879,437.8	0.0	1,879,437.8	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 October 25, 2018. Current data is reviewed in conjunction with each annual valuation.
Mortality Rates:	
Healthy Post-Retirement Mortality:	110% of PubG-2010 Healthy Annuitant Table, with mortality improvements projected generationally using scale MP-2017
Active Mortality:	110% of PubG-2010 Healthy Employee Table, with mortality improvements projected generationally using scale MP-2017
	The mortality tables specified above were determined to contain provisions appropriate to reasonably reflect future mortality improvement, based on a review of mortality experience as of the most recent experience study date.
Termination:	Select and ultimate termination rates are based on recent experience of the Fund. 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	17.5
1 - 1.99	13.0
2 - 2.99	13.0
3 - 3.99	12.5
4 - 4.99	12.5
5 - 5.99	10.0
6 - 6.99	10.0
7 - 7.99	10.0

Ultimate rates:

Age	Rate (%)
20	7.0
25	7.0
30	6.0
35	4.0
40	4.0
45	4.0
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. Sample rates are shown below.

	Rate (%)	
Age	<30 Years of Service	30+ Years of Service
50	2.5	30.0
55	2.5	20.0
60	5.0	5.0
65	15.0	15.0
70	20.0	20.0
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. 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. Rates are shown below.

Years of Service	Rate (%)
0 – 0.99	20.00
1 – 1.99	7.50
2 – 2.99	5.00
3 – 3.99	3.50
4 – 4.99	3.50
5+	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:	7.25% per year, net of investment expenses
Inflation:	2.50% per year
Payroll Growth:	2.50% per year
Administrative Expenses:	Equal to actual expenses for the prior year, increased by 3.5%.
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. 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 2020, the annual salary is limited to $115,928.92. 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 ninth 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 2020 and thereafter.

EXHIBIT 1

Net Pension Liability

The components of the net pension liability of the Fund at December 31, 2019 were as follows:	
Total pension liability	$2,046,085,330
Plan fiduciary net position	354,556,288
Net pension liability	1,691,529,042
Plan fiduciary net position as a percentage of the total pension liability	17.33%

Actuarial assumptions. The total pension liability was determined by an actuarial valuation as of December 31, 2019, using the following actuarial assumptions, applied to all periods included in the measurement:

Inflation	2.50%
Salary increases	Service-based ranging from 20% to 2.75%
Single equivalent discount rate	2.84%, 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 and beneficiaries of employees who first became a participant on or after January 1, 2011; 3% compounded for beneficiaries of employees who first became a participant by January 1, 2011.

For healthy annuitants, mortality rates were based on 110% of PubG-2010 Healthy Annuitant Table, with mortality improvements projected generationally using scale MP-2017. For active participants, mortality rates were based on 110% of PubG-2010 Healthy Employee Table, with mortality improvements projected generationally using scale MP-2017.

The actuarial assumptions used in the December 31, 2019, valuation were based on the results of an experience study for the five-year period ending December 31, 2018.

Discount rate: The discount rate used to measure the total pension liability was 2.84%. The projection of cash flows used to determine the discount rate assumed member contributions will be made at the 9% contribution rate for 2020 and thereafter.

Employer contributions will be made at the 1.1 multiple of member contributions from two years prior for 2020 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 (7.25%). Starting in 2026, the projected benefit payments were discounted at the municipal bond index (2.74%, based on the Bond Buyer 20-GO Municipal Bond Index as of December 26, 2019). Therefore, a single equivalent, blended discount rate of 2.84% 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 2.84%, 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 (1.84%) or 1-percentage-point higher (3.84%) than the current rate:

	1% Decrease (1.84%)	Current Discount Rate (2.84%)	1% Increase (3.84%)
Net pension liability as of December 31, 2019	$2,031,154,003	$1,691,529,042	$1,418,852,853

EXHIBIT 2

Schedule of Changes in Net Pension Liability

	2019	2018
Total pension liability		
Service cost	$33,317,058	$38,102,341
Interest	69,086,515	59,290,982
Change of benefit term	0	0
Differences between expected and actual experience	15,529,818	5,001,084
Changes of assumptions	359,734,367	-3,471,090
Benefit payments, including refunds of employee contributions	-78,550,449	-76,526,820
Net change in total pension liability	399,117,309	22,396,497
Total pension liability – beginning	1,646,968,021	1,624,571,524
Total pension liability – ending (a)	2,046,085,330	1,646,968,021
Plan fiduciary net position		
Contributions – employer	27,682,089	27,638,402
Contributions – employee	12,664,855	12,125,457
Net investment income	51,982,545	-17,196,812
Benefit payments, including refunds of employee contributions	-78,550,449	-76,526,820
Administrative expense	-1,528,861	-1,501,039
Other	50,236	67,927
Net change in plan fiduciary net position	12,300,415	-55,392,885
Plan fiduciary net position – beginning	342,255,873	397,648,758
Plan fiduciary net position – ending (b)	354,556,288	342,255,873
Fund's net pension liability – ending (a) – (b)	1,691,529,042	1,304,712,148
Plan fiduciary net position as a percentage of the total pension liability	17.33%	20.78%
Covered employee payroll	$139,204,051	$133,112,100
Fund's net pension liability as percentage of covered employee payroll	1,215.14%	980.16%

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, 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%
December 31, 2018	50,929,734	27,638,402	23,291,332	133,112,100	20.76%
December 31, 2019	61,887,790	27,682,089	34,205,701	139,204,051	19.89%

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" for the fiscal year ended December 31, 2019:	
Actuarial cost method	Entry Age Actuarial cost method
Amortization method	23-year closed, level percentage of payroll amortization
Asset valuation method	5-year smoothed market
Actuarial assumptions:	
Investment rate of return	7.25%, net of investment expense
Projected salary increases	Service-based ranging from 20% to 2.75%
Mortality	For healthy annuitants, mortality rates were based on 110% of PubG-2010 Healthy Annuitant Table, with mortality improvements projected generationally using scale MP-2017. For active participants, mortality rates were based on 110% of PubG-2010 Healthy Employee Table, with mortality improvements projected generationally using scale MP-2017.
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 and beneficiaries of employees who first became a participant on or after January 1, 2011; 3% compounded for beneficiaries of employees who first became a participant by January 1, 2011.
Other assumptions:	Same as those used in the December 31, 2019, actuarial funding valuations based on the results of an experience study for the five-year period ending December 31, 2018.

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