

# Public School Teachers' Pension and Retirement Fund of Chicago

Actuarial Valuation and Review as of  
June 30, 2016





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October 27, 2016

Board of Trustees

Public School Teachers' Pension and Retirement Fund of Chicago

203 North LaSalle Street, Suite 2600

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Dear Board Members:

We are pleased to submit this annual Actuarial Valuation and Review as of June 30, 2016. It summarizes the actuarial data used in the valuation, analyzes the preceding year's experience, establishes the net pension liability under Governmental Accounting Standards Board (GASB) Statement No. 67 as of June 30, 2016, the actuarially determined contribution for the fiscal year ending June 30, 2017, the statutorily required contributions for the fiscal year ending June 30, 2018, and the liabilities of the other postemployment benefits as of June 30, 2016, under GASB Statement No. 43.

This report was prepared in accordance with generally accepted actuarial principles and practices at the request of the Board to assist in administering the Public School Teachers' Pension and Retirement Fund of Chicago (CTPF). The census 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. The accuracy and comprehensiveness of the data are the responsibility of those supplying the data.

Since the effective date of the last actuarial valuation, there have not been any changes in benefit provisions that have had an impact on the actuarial liabilities of the Fund.

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 June 30, 2016, 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 June 30, 2013, valuation. These actuarial assumptions and methods comply with the parameters set by the Actuarial Standards of Practice and the parameters for disclosure of GASB 43 and 67.

CTPF is funded by employer and member contributions in accordance with the funding policy specified under the Illinois Pension Code (40 ILCS 5/17). Based on the funding objective under the Illinois Pension Code, for Fiscal Years 2017 through 2059, the Board of Education is to make annual contributions calculated as a level percent of payroll sufficient to bring the total assets of the Fund up to 90% of the total actuarial accrued liabilities of the Fund by the end of the 2059 fiscal year. The methods mandated by the Illinois Pension Code are inadequate to appropriately fund CTPF. We strongly recommend an actuarial funding method that targets 100% funding with payments at least covering interest on the unfunded actuarial accrued liability and a portion of the principal balance.

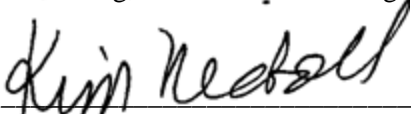
The asset values used for the valuation were based on the asset information contained in the audited financial statements prepared by the Fund. For purposes of the actuarial valuation, a 4-year smoothed market value of assets was used to determine the actuarial value of assets. The actuarial value of assets for pension benefits is the total actuarial value of assets less the market value of assets dedicated for other postemployment benefits.

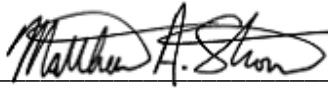
The measurements shown in this actuarial valuation may not be applicable for other purposes. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic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

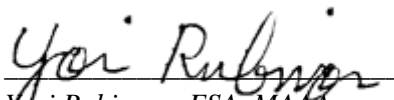
The actuarial calculations were directed under our supervision. We are members of the American Academy of Actuaries and we meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. To the best of our knowledge, the information supplied in the actuarial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

By:   
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## SECTION 1: Valuation Summary for the Public School Teachers' Pension and Retirement Fund of Chicago

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### Purpose

This report has been prepared by Segal Consulting to present a valuation of the Public School Teachers' Pension and Retirement Fund of Chicago (CTPF) as of June 30, 2016. The valuation was performed to determine the overall funded status and contribution requirements of the Fund. The contribution requirements presented in this report are based on:

- The benefit provisions of the Fund, as administered by the Board;
- The characteristics of covered active participants, inactive participants, and retirees and beneficiaries as of June 30, 2016, provided by the CTPF staff;
- The assets of the Fund as of June 30, 2016, provided by the CTPF 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. Public Act 96-0889 specifies that, for Fiscal Years 2014 through 2059, the Board of Education is to make annual contributions calculated as a level percent of payroll sufficient to bring the total assets of the fund up to 90% of the total actuarial liabilities of the fund by the end of Fiscal Year 2059. Based on our projection, we have determined that the Board of Education's required contribution for Fiscal Year 2018 is \$760,244,000. In conjunction with the additional State contributions and additional Board of Education contributions of \$11,692,000 and \$12,466,000, respectively, Fiscal Year 2018 contributions will total \$784,402,000.
2. As shown in Chart 13, for the fiscal year beginning July 1, 2016, the actuarially determined contribution (ADC) amount is \$754,764,093. The ADC is calculated based on the funding policy and is measured against actual contributions as a measure of funding adequacy. The Fiscal Year 2017 required employer contribution amount was determined to be \$745,386,000, as a part of the June 30, 2015, valuation. Given that \$65,000,000 is expected to be used to pay health insurance subsidies, the required employer contribution for the pension plan is \$680,386,000. Compared to the actuarially determined contribution of \$754,764,093, the contribution deficiency is \$74,378,093 for Fiscal Year 2017. Each year there is a contribution deficiency leads to an increased deficiency in all future years.

## SECTION 1: Valuation Summary for the Public School Teachers' Pension and Retirement Fund of Chicago

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3. The funded ratio based on the actuarial value of assets over the actuarial accrued liability as of June 30, 2016, is 52.4%, compared to 51.8% as of June 30, 2015.
4. For the year ended June 30, 2016, Segal has determined that the asset return on a market value basis was -0.3%. After gradual recognition of investment gains and losses under the actuarial smoothing method, the actuarial rate of return was 8.6%. This represents an experience gain when compared to the assumed rate of 7.75%. As of June 30, 2016, the actuarial value of assets (\$10.63 billion) represented 105.1% of the market value (\$10.11 billion).
5. The total unrecognized investment loss as of June 30, 2016, is \$517,679,243. 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 7.75% per year (net of expenses) on a market value basis will result in investment losses on the actuarial value of assets in the next few years.
6. The portion of deferred investment gains and losses recognized in the calculation of the June 30, 2016, actuarial value of assets resulted in a gain of \$81,129,490. Additionally, the demographic and liability experience resulted in a \$149,058,710 gain.
7. The Governmental Accounting Standards Board (GASB) approved two new Statements affecting the reporting of other postemployment benefits (OPEB) liabilities for accounting purposes. Statement 74 replaces Statement 43 and is for plan reporting. Statement 75 replaces Statement 45 and is for employer reporting. Statement 74 is effective with the fiscal year ending June 30, 2017, for Plan reporting. Statement 75 is effective with the fiscal year ending June 30, 2018, for employer reporting.
8. When measuring pension liability, GASB uses a different actuarial cost method (Entry Age Normal method) than the cost method used for funding purposes (Projected Unit Credit method). However, as of June 30, 2016, the GASB blended discount rate calculation results in the same discount rate (expected return on assets) as used for funding purposes (7.75%). The total pension liability (TPL) measure for financial reporting, based on the Entry Age Normal actuarial cost method and 7.75% discount rate, is \$21,124,697,012 as of June 30, 2016.
9. The net pension liability (NPL) is equal to the difference between the TPL and the Fund's fiduciary net position. The Fund's fiduciary net position is equal to the market value of assets. The NPL increased from \$10,023,262,976 as of June 30, 2015, to \$11,031,629,424 as of June 30, 2016.

## **SECTION 1: Valuation Summary for the Public School Teachers' Pension and Retirement Fund of Chicago**

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10. As mentioned above, the current method used to determine the actuarial value of assets yields an amount that is 105.1% of the market value of assets as of June 30, 2016. 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 market value. We believe the actuarial asset method currently complies with these guidelines.
11. This actuarial valuation report as of June 30, 2016, is based on financial data as of that date. Changes in the value of assets subsequent to that date are not reflected.

**SECTION 1: Valuation Summary for the Public School Teachers' Pension and Retirement Fund of Chicago**

**Summary of Key Valuation Results**

|   | <b>2017</b>       | <b>2016</b>       | <b>2015</b>       |
|---|-------------------|-------------------|-------------------|
| <b>Contributions for fiscal year beginning July 1:</b>    |                   |                   |                   |
| Required Board of Education contributions                 | \$760,244,000     | \$720,208,000     | \$675,059,000     |
| Additional Board of Education contributions               | 12,466,000        | 12,992,000        | 12,906,000        |
| Additional State contributions                            | <u>11,692,000</u> | <u>12,186,000</u> | <u>12,105,000</u> |
| Total employer contributions                              | 784,402,000       | 745,386,000       | 700,070,000       |
| Actual employer contributions                             |                   | --                | 700,070,000       |
| <b>Funding elements for fiscal year beginning July 1:</b> |                   |                   |                   |
| Normal cost, including administrative expenses            |                   | \$201,753,858     | \$205,404,986     |
| Market value of assets                                    |                   | 10,113,297,310    | 10,711,667,479    |
| Actuarial value of assets                                 |                   | 10,630,976,553    | 10,366,088,281    |
| Actuarial accrued liability*                              |                   | 20,246,140,298    | 19,951,289,974    |
| Unfunded/(overfunded) actuarial accrued liability         |                   | 9,615,163,745     | 9,585,201,693     |
| Funded ratio  |                   | 52.51%            | 51.96%            |
| <b>Demographic data for plan year beginning July 1:</b>   |                   |                   |                   |
| Number of retirees and beneficiaries                      |                   | 28,298            | 28,114            |
| Number of vested former participants                      |                   | 5,715             | 5,464             |
| Number of non-vested former participants                  |                   | 22,042            | 21,365            |
| Number of active participants                             |                   | 29,543            | 29,706            |
| Total salary supplied by the Fund                         |                   | \$2,071,040,979   | \$2,155,604,327   |
| Average salary  |                   | \$70,103          | \$72,565          |

\*Pension only



**SECTION 1: Valuation Summary for the Public School Teachers' Pension and Retirement Fund of Chicago**

**Summary of Key Valuation Results: Pension**

|  | <b>2016</b>      | <b>2015</b>      |
|--|------------------|------------------|
| <b>Contributions for plan year beginning July 1:</b>                   |                  |                  |
| Actuarially determined contribution requirement                        | \$754,764,093    | \$749,796,517    |
| Expected employer contributions  | 680,386,000      | 635,070,000      |
| Actual   | --               | 635,070,000      |
| <b>Funding elements for plan year beginning July 1:</b>                |                  |                  |
| Employer normal cost, including administrative expenses                | \$136,753,858    | \$140,404,986    |
| Market value of assets   | 10,093,067,588   | 10,689,954,320   |
| Actuarial value of assets  | 10,610,746,831   | 10,344,375,122   |
| Actuarial accrued liability  | 20,246,140,298   | 19,951,289,974   |
| Unfunded/(overfunded) actuarial accrued liability                      | 9,635,393,467    | 9,606,914,852    |
| Funded ratio based on the actuarial value of assets                    | 52.41%           | 51.85%           |
| Funded ratio based on the market value of assets                       | 49.85%           | 53.58%           |
| <b>GASB Information:</b>   |                  |                  |
| Long-term expected rate of return                                      | 7.75%            | 7.75%            |
| Municipal bond index   | 2.85%            | 3.80%            |
| Single equivalent discount rate  | 7.75%            | 7.75%            |
| Total pension liability  | \$21,124,697,012 | \$20,713,217,296 |
| Plan fiduciary net position  | 10,093,067,588   | 10,689,954,320   |
| Net pension liability  | 11,031,629,424   | 10,023,262,976   |
| Plan fiduciary net position as a percentage of total pension liability | 47.78%           | 51.61%           |

**SECTION 1: Valuation Summary for the Public School Teachers' Pension and Retirement Fund of Chicago**

**Summary of Key Valuation Results: OPEB**

|  | <b>2016</b>       | <b>2015</b>       |
|--|-------------------|-------------------|
| <b>Contributions for the plan year beginning July 1:</b> |                   |                   |
| Expected employer contributions                          | \$65,000,000      | \$65,000,000      |
| Actual employer contributions                            | ---               | 65,000,000        |
| <b>Funding elements for plan year beginning July 1:</b>  |                   |                   |
| Employer normal cost, including administrative expenses  | \$65,000,000      | \$65,000,000      |
| Market value of assets                                   | 20,229,722        | 21,713,159        |
| <b>GASB 43 information:</b>                              |                   |                   |
| Discount rate  | 3.50%             | 4.50%             |
| Actuarial accrued liability                              | \$2,222,546,319   | \$1,910,991,991   |
| Actuarial value of assets                                | <u>20,229,722</u> | <u>21,713,159</u> |
| Unfunded/(overfunded) actuarial accrued liability        | 2,202,316,597     | 1,889,278,832     |
| Annual Required Contributions (ARC)                      | \$149,473,848     | \$135,505,273     |

## SECTION 1: Valuation Summary for the Public School Teachers' Pension and Retirement Fund of Chicago

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### 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 CTPF 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 market value of assets as of the valuation date, as provided by Fund staff, and 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 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.

## SECTION 1: Valuation Summary for the Public School Teachers' Pension and Retirement Fund of Chicago

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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 CTPF 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 CTPF'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.

**SECTION 2: Valuation Results for the Public School Teachers' Pension and Retirement Fund of Chicago**

**A. MEMBER DATA**

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

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

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

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

**CHART 1**  
**Participant Population: 2007 – 2016**

| <b>Year Ended<br/>June 30</b> | <b>Active<br/>Participants</b> | <b>Vested Terminated<br/>Participants*</b> | <b>Retirees<br/>and Beneficiaries</b> | <b>Ratio of Non-Actives<br/>to Actives</b> |
|-------------------------------|--------------------------------|--|---------------------------------------|--|
| 2007                          | 32,968                         | 2,752                                      | 23,623                                | 0.80                                       |
| 2008                          | 32,086                         | 3,479                                      | 23,920                                | 0.85                                       |
| 2009                          | 31,905                         | 3,056                                      | 24,218                                | 0.85                                       |
| 2010                          | 31,012                         | 3,554                                      | 24,600                                | 0.91                                       |
| 2011                          | 30,133                         | 4,253                                      | 25,199                                | 0.98                                       |
| 2012                          | 30,366                         | 4,245                                      | 25,926                                | 0.99                                       |
| 2013                          | 30,969                         | 4,502                                      | 27,440                                | 1.03                                       |
| 2014                          | 30,654                         | 4,818                                      | 27,722                                | 1.06                                       |
| 2015                          | 29,706                         | 5,464                                      | 28,114                                | 1.13                                       |
| 2016                          | 29,543                         | 5,715                                      | 28,298                                | 1.15                                       |

*\*Excludes non-vested terminated participants due a refund of member contributions*

**SECTION 2: Valuation Results for the Public School Teachers' Pension and Retirement Fund of Chicago**

**Active Participants**

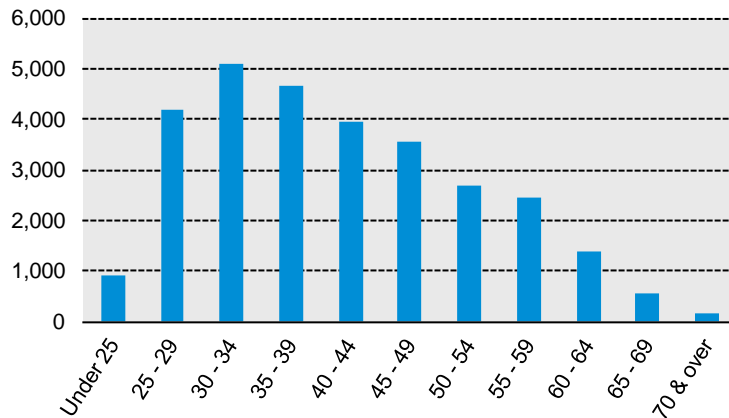
Plan costs are affected by the age, years of service and salary of active participants. In this year's valuation, there were 29,543 active participants with an average age of 41.5, average years of service of 10.4 and average salary of \$70,103. The 29,706 active participants in the prior valuation had an average age of 41.4, average years of service of 10.3 and average salary of \$72,565.

**Inactive Participants**

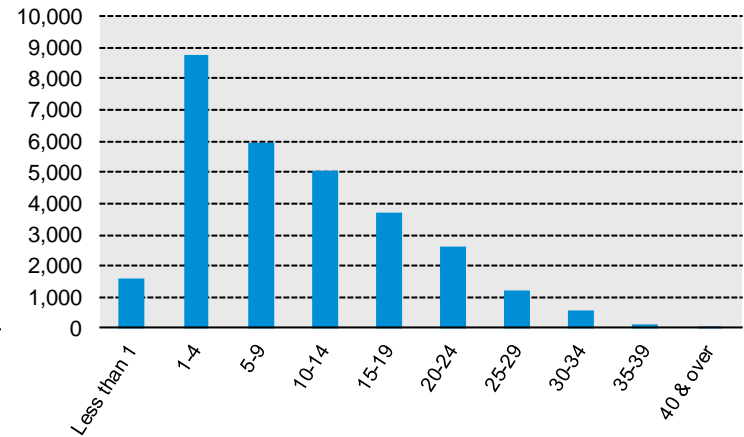
In this year's valuation, there were 5,715 participants with a vested right to a deferred or immediate vested benefit and 22,042 terminated non-vested participants entitled to a refund of member contributions.

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

**CHART 2**  
**Distribution of Active Participants by Age as of June 30, 2016**



**CHART 3**  
**Distribution of Active Participants by Years of Service as of June 30, 2016**



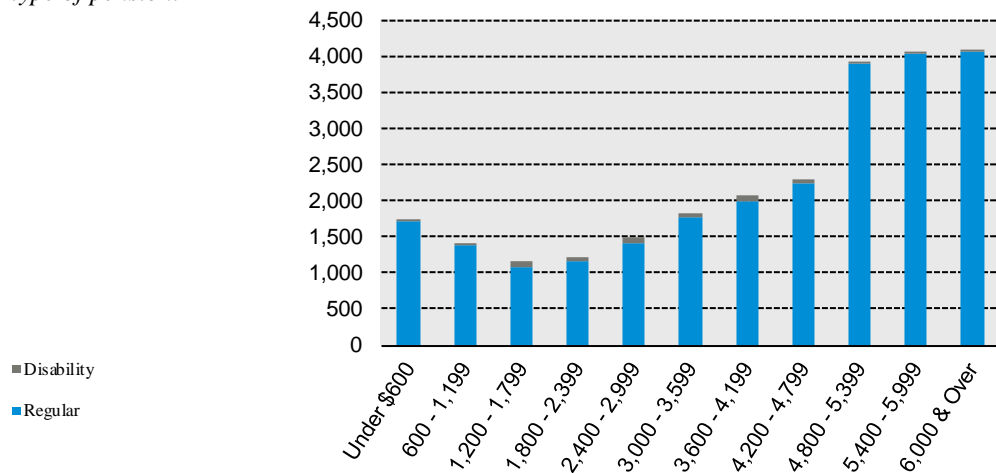
**SECTION 2: Valuation Results for the Public School Teachers' Pension and Retirement Fund of Chicago**

**Retirees and Beneficiaries**

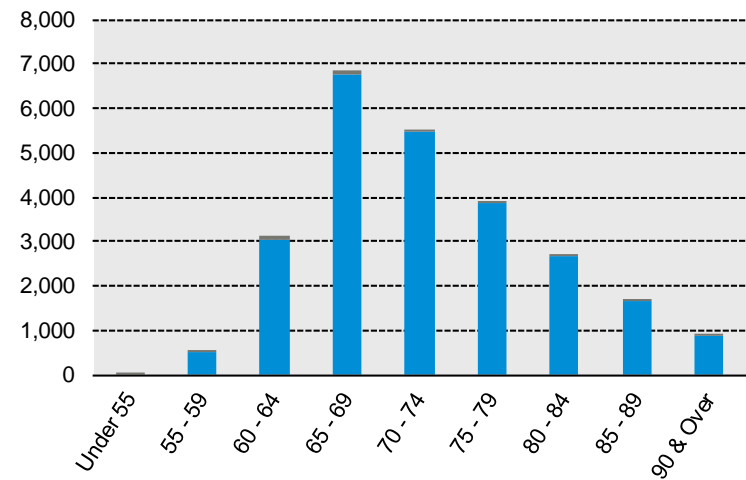
As of June 30, 2016, 24,732 retirees, 3,090 beneficiaries, and 476 disabled retirees were receiving total monthly benefits of \$113,490,213. For comparison, in the previous valuation, there were 24,594 retirees, 3,050 beneficiaries, and 470 disabled retirees receiving monthly benefits of \$109,988,699.

*These graphs show a distribution of the current retirees based on their monthly amount and age, by type of pension.*

**CHART 4**  
**Distribution of Retirees by Monthly Amount as of June 30, 2016**



**CHART 5**  
**Distribution of Retirees by Age as of June 30, 2016**



## SECTION 2: Valuation Results for the Public School Teachers' Pension and Retirement Fund of Chicago

### 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 market 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 market 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 Years Ended June 30, 2016 and June 30, 2015

|     |  | 2016                    |                         | 2015 |                         |
|-----|--|-------------------------|-------------------------|------|-------------------------|
| 1.  | Actuarial value of assets as of prior June 30                    |                         | \$10,366,088,281        |      | \$10,081,520,019        |
| 2.  | Employer and employee contributions and miscellaneous income     |                         | 893,415,480             |      | 900,844,244             |
| 3.  | Benefits and expenses  |                         | 1,463,798,486           |      | 1,422,589,121           |
| 4.  | Expected investment income                                       |                         | 754,141,788             |      | 733,639,341             |
| 5.  | Total investment income, including income for securities lending |                         | -27,987,163             |      | 381,740,298             |
| 6.  | Investment gain/(loss) for the year ended June 30: (5) – (4)     |                         | (782,128,951)           |      | (351,899,043)           |
| 7.  | Expected actuarial value of assets: (1) + (2) – (3) + (4)        |                         | 10,549,847,063          |      | 10,293,414,483          |
| 8.  | Calculation of recognized return                                 |                         | %                       |      | %                       |
|     |  | <u>Original Amount*</u> | <u>Recognized</u>       |      | <u>Recognized</u>       |
| (a) | Year ended June 30, 2016   | -\$782,128,951          | 25% -\$195,532,238      |      | --                      |
| (b) | Year ended June 30, 2015   | -351,899,043            | 25% -87,974,761         | 25%  | -\$87,974,761           |
| (c) | Year ended June 30, 2014   | 998,377,727             | 25% 249,594,432         | 25%  | 249,594,432             |
| (d) | Year ended June 30, 2013   | 460,168,226             | 25% <u>115,042,057</u>  | 25%  | 115,042,057             |
| (e) | Year ended June 30, 2012   | -815,951,719            |                         | 25%  | <u>-203,987,930</u>     |
| (f) | Total recognized return  |                         | <u>81,129,490</u>       |      | <u>72,673,798</u>       |
| 9.  | Total actuarial value of assets as of June 30: (7) + (8f)        |                         | 10,630,976,553          |      | 10,366,088,281          |
| 10. | Assets for retiree health insurance benefits                     |                         | <u>20,229,722</u>       |      | <u>21,713,159</u>       |
| 11. | Actuarial value of assets for pension benefits: (9) – (10)       |                         | <u>\$10,610,746,831</u> |      | <u>\$10,344,375,122</u> |

\* Total return minus expected return on actuarial value



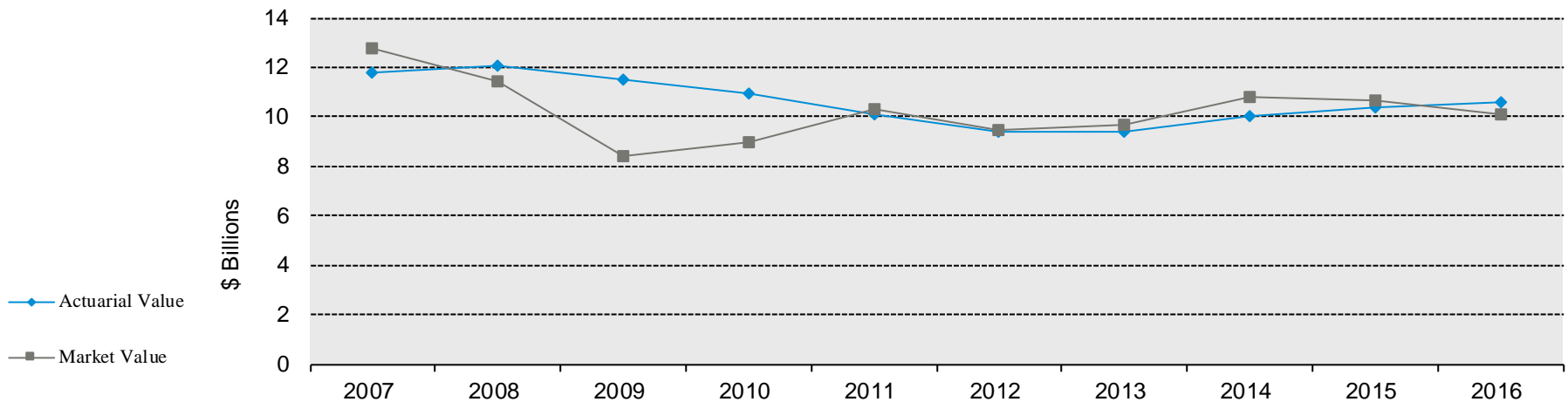
## SECTION 2: Valuation Results for the Public School Teachers' Pension and Retirement Fund of Chicago

Both the actuarial value and market 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 market 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 market value over the past ten years.*

**CHART 7**

**Actuarial Value of Assets vs. Market Value of Assets as of June 30, 2007 – 2016**



**SECTION 2: Valuation Results for the Public School Teachers’ Pension and Retirement Fund of Chicago**

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**C. ACTUARIAL EXPERIENCE**

To calculate the actuarially determined contribution, 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 years’ 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 \$230,188,200; \$81,129,490 from investment gains and \$149,058,710 in gains from all other sources. The net experience variation from individual sources other than investments was approximately 0.7% 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 June 30, 2016**

|   |                    |
|---|--------------------|
| 1. Net gain/(loss) from investments*                        | \$81,129,490       |
| 2. Net gain/(loss) from pension administrative expenses     | -8,022             |
| 3. Net gain/(loss) from retiree health insurance cash flows | -1,673,226         |
| 4. Net gain/(loss) from other experience**                  | <u>150,739,958</u> |
| 5. Net experience gain/(loss): (1) + (2) + (3) + (4)        | \$230,188,200      |

\* Details in Chart 9

\*\* Details in Chart 12

**SECTION 2: Valuation Results for the Public School Teachers' Pension and Retirement Fund of Chicago**

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**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 CTPF's investment policy. For valuation purposes, the assumed rate of return on the actuarial value of assets is 7.75%. The actual rate of return on an actuarial basis for the year ending June 30, 2016, was 8.58%.

Since the actual return for the year was greater than the assumed return, the Fund experienced an actuarial gain during the year ended June 30, 2016, with regard to its investments.

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

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**CHART 9**  
**Actuarial Value Investment Experience for Year Ended June 30, 2016**

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|                                     |                     |
|-------------------------------------|---------------------|
| 1. Actual return                    | \$835,271,278       |
| 2. Average value of assets          | 9,730,861,778       |
| 3. Actual rate of return: (1) ÷ (2) | 8.58%               |
| 4. Assumed rate of return           | 7.75%               |
| 5. Expected return: (2) x (4)       | \$754,141,788       |
| 6. Actuarial gain/(loss): (1) – (5) | <u>\$81,129,490</u> |

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**SECTION 2: Valuation Results for the Public School Teachers' Pension and Retirement Fund of Chicago**

Because actuarial planning is long term, it is useful to see how the assumed investment rate of return has followed actual experience over time. Chart 10 shows the rate of return on an actuarial basis compared to the market value investment return for the last twenty-five years, including ten-year and twenty-five-year averages.

**CHART 10  
Investment Return**

| <b>Year Ended June 30</b> | <b>Market Value</b> | <b>Actuarial Value*</b> |
|---------------------------|---------------------|-------------------------|
| 1992                      | 12.8%               | n/a                     |
| 1993                      | 14.3%               | n/a                     |
| 1994                      | 0.4%                | n/a                     |
| 1995                      | 18.7%               | n/a                     |
| 1996                      | 16.3%               | n/a                     |
| 1997                      | 19.8%               | n/a                     |
| 1998                      | 18.2%               | n/a                     |
| 1999                      | 10.7%               | n/a                     |
| 2000                      | 9.5%                | n/a                     |
| 2001                      | -1.5%               | n/a                     |
| 2002                      | -3.3%               | n/a                     |
| 2003                      | 4.0%                | 2.3%                    |
| 2004                      | 15.0%               | 3.2%                    |
| 2005                      | 10.8%               | 6.0%                    |
| 2006                      | 10.7%               | 9.6%                    |
| 2007                      | 17.7%               | 13.3%                   |
| 2008                      | -5.3%               | 7.9%                    |
| 2009                      | -22.4%              | 0.2%                    |
| 2010                      | 13.6%               | -0.4%                   |
| 2011                      | 24.8%               | -0.5%                   |
| 2012                      | -0.4%*              | 1.0%                    |
| 2013                      | 13.1%*              | 11.2%                   |
| 2014                      | 17.9%*              | 12.8%                   |
| 2015                      | 3.6%*               | 8.2%                    |
| 2016                      | -0.3%*              | 8.6%                    |
| <b>Average Returns</b>    |                     |                         |
| Last 10 years:            | 5.3%                | 6.1%                    |
| Last 25 years:            | 8.2%                | n/a                     |

\* As determined by Segal

**SECTION 2: Valuation Results for the Public School Teachers' Pension and Retirement Fund of Chicago**

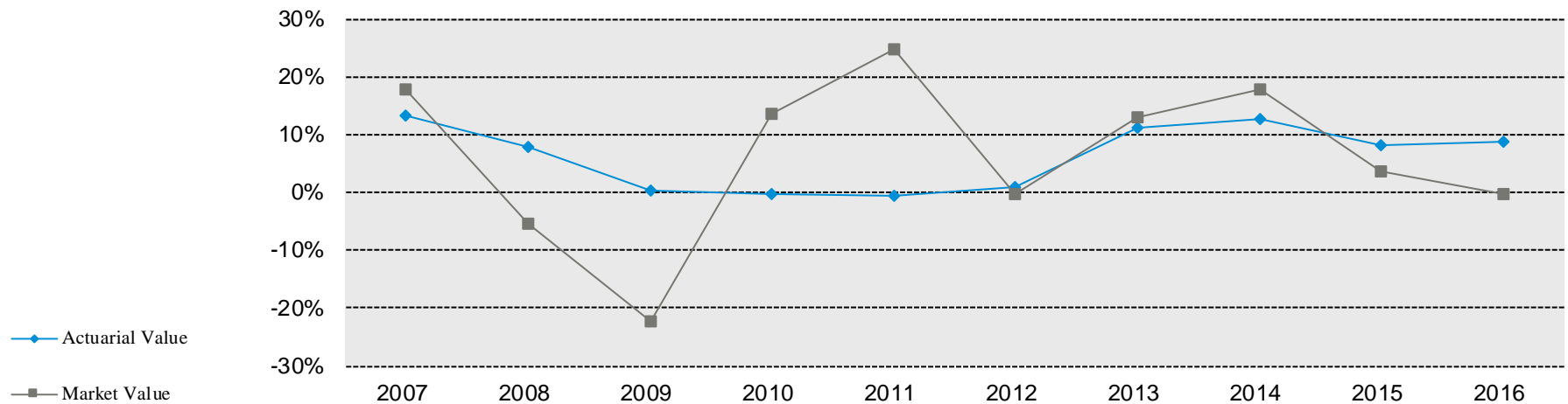
Subsection B described the actuarial asset valuation method that gradually takes into account fluctuations in the market value rate of return. The effect of this is to stabilize the actuarial rate of return, which contributes to leveling pension plan costs. Chart 11 illustrates that the asset returns on a market basis are more volatile than asset returns on an actuarial basis.

**Administrative Expenses**

Administrative expenses for pension benefits for the year ended June 30, 2016, totaled \$12,298,862 compared to the assumption of \$12,290,840. This resulted in a loss of \$8,022 for the year.

*This chart illustrates how this leveling effect has actually worked over the years 2007 - 2016.*

**CHART 11**  
**Market and Actuarial Rates of Return for Years Ended June 30, 2007 - 2016**



**SECTION 2: Valuation Results for the Public School Teachers' Pension and Retirement Fund of Chicago**

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**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 gain from this other experience for the year ended June 30, 2016, amounted to \$150,739,958, which is approximately 0.7% of the actuarial accrued liability.

A brief summary of the demographic gain/(loss) experience of the CTPF for the year ended June 30, 2016, is shown in the chart below.

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

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**CHART 12**  
**Experience Due to Changes in Demographics for Year Ended June 30, 2016**

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|  |                    |
|--|--------------------|
| 1. Termination   | \$6,458,419        |
| 2. Retirement  | -47,235,684        |
| 3. Deaths among retired participants and beneficiaries | -15,811,894        |
| 4. Salary/service increase for continuing actives      | 264,801,612        |
| 5. Miscellaneous                                       | <u>-57,472,495</u> |
| 6. Total   | \$150,739,958      |

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## SECTION 2: Valuation Results for the Public School Teachers' Pension and Retirement Fund of Chicago

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### D. DEVELOPMENT OF EMPLOYER COSTS

#### **Additional State Contributions**

According to Section 17-127 of the Pension Code, the State shall make additional contributions of .544% of payroll to the Fund to offset a portion of the cost of benefit increases enacted under Public Act 90-582, except that no additional contributions are required if for the previous fiscal year the ratio of the fund's assets to total actuarial liabilities was at least 90%.

Based on the June 30, 2016, actuarial valuation, the ratio of the actuarial value of assets to total actuarial liabilities, or funded ratio, amounts to 52.5%. Therefore, additional State contributions will be required for Fiscal Year 2018. The total payroll for FY 2018 is projected to be \$2,299,737,511. This total payroll includes employee contributions of 7% of salary paid by the Board of Education. Excluding these employee contributions from payroll results in an adjusted projected payroll of \$2,149,287,393. Based on this adjusted projected payroll for Fiscal Year 2018, we have determined the additional State contributions under Section 17-127 of the Pension Code to be \$11,692,000.

#### **Additional Board of Education Contributions**

According to Section 17-127.2 of the Pension Code, the Board of Education shall make additional contributions of .58% of each teacher's salary to the Fund to offset a portion of the cost of benefit increases enacted under Public Act 90-582, except that no additional contributions are required if for the previous fiscal year the ratio of the fund's assets to total actuarial liabilities was at least 90%. As the funded ratio as of June 30, 2016, is 52.5%, additional Board of Education contributions will be required for Fiscal Year 2018. Based on adjusted projected payroll of \$2,149,287,393 for Fiscal Year 2018, we have determined the additional Board of Education contribution under Section 17-127.2 of the Pension Code to be \$12,466,000.

#### **Board of Education Required Contribution**

Senate Bill 1946, which was signed into law on April 14, 2010, as Public Act 96-0889, revised the funding provisions that had previously been in effect. Public Act 96-0889 specifies that, for Fiscal Years 2014 through 2059, the Board of Education is to make annual contributions calculated as a level percent of payroll sufficient to bring the total assets of the fund up to 90% of the total actuarial liabilities of the fund by the end of Fiscal Year 2059. Based on our projection, we have determined that the Board of Education's required contribution for Fiscal Year 2018 is \$760,244,000 (net of Additional State and Board of Education Contributions).

## SECTION 2: Valuation Results for the Public School Teachers' Pension and Retirement Fund of Chicago

The actuarially determined contribution is calculated based on the funding policy and is measured against actual contributions as a measure of funding adequacy. 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 participants to determine the actuarially determined contribution of 33.89% of payroll.

Effective July 1, 2013, the amortization period was set to 30 years, but will decline by one year in each subsequent valuation. As of July 1, 2016, there are 27 years remaining on this schedule.

For the plan year beginning July 1, 2016, the actuarially determined contribution is \$754,764,093. Compared to the Fiscal Year 2017 required employer contributions for pension benefits of \$680,386,000, the contribution deficiency is \$74,378,093.

*The chart shows the calculation of the actuarially determined contribution for the upcoming year.*

### CHART 13 Actuarially Determined Contribution

|   | Year Beginning July 1 |               |                       |               |
|---|-----------------------|---------------|-----------------------|---------------|
|   | 2016                  |               | 2015                  |               |
|   | Amount                | % of Payroll  | Amount                | % of Payroll  |
| 1. Total normal cost*   | \$306,165,499         | 13.75%        | \$323,443,952         | 13.93%        |
| 2. Administrative expenses  | 12,913,805            | 0.58%         | 12,290,840            | 0.53%         |
| 3. Expected employee contributions  | <u>-187,335,273</u>   | <u>-8.41%</u> | <u>-195,329,806</u>   | <u>-8.41%</u> |
| 4. Employer normal cost: (1) + (2) + (3)                                  | 131,744,031           | 5.92%         | 140,404,986           | 6.05%         |
| 5. Employer normal cost, adjusted for timing**                            | 136,753,858           | 6.14%         | 145,744,163           | 6.28%         |
| 6. Actuarial accrued liability  | 20,246,140,298        |               | 19,951,289,974        |               |
| 7. Actuarial value of assets  | <u>10,610,746,831</u> |               | <u>10,344,375,122</u> |               |
| 8. Unfunded actuarial accrued liability: (6) - (7)                        | \$9,635,393,467       |               | \$9,606,914,852       |               |
| 9. Payment on unfunded actuarial accrued liability, adjusted for timing** | 618,010,235           | 27.75%        | 604,052,354           | 26.01%        |
| 10. Actuarially determined contribution, adjusted for timing: (5) + (9)   | <u>754,764,093</u>    | <u>33.89%</u> | <u>749,796,517</u>    | <u>32.29%</u> |
| 11. Projected payroll   | \$2,227,208,231       |               | \$2,322,254,343       |               |

\* Reflects timing adjustment to the middle of the year

\*\* Employer contributions are assumed to be paid at the end of the year.



**SECTION 2: Valuation Results for the Public School Teachers' Pension and Retirement Fund of Chicago**

The contribution requirements as of June 30, 2016, are 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.

**Reconciliation of Actuarially Determined Contribution**

The chart below details the changes in the actuarially determined contribution from the prior valuation to the current year's valuation.

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

**CHART 14**

**Reconciliation of Actuarially Determined Contribution from July 1, 2015 to July 1, 2016**

|  |                    |
|--|--------------------|
| <b>Actuarially Determined Contribution as of July 1, 2015</b>                | \$749,796,517      |
| Effect of plan changes   | \$0                |
| Effect of expected change in amortization payment due to payroll growth      | 21,141,832         |
| Effect of change in administrative expense assumption                        | 646,655            |
| Effect of contributions (more)/less than actuarially determined contribution | 8,474,777          |
| Effect of investment (gain)/loss   | -5,295,213         |
| Effect of other gains and losses on accrued liability                        | -9,513,507         |
| Effect of net other changes*   | <u>-10,486,968</u> |
| <b>Total change</b>  | <u>\$4,967,576</u> |
| <b>Actuarially Determined Contribution as of July 1, 2016</b>                | \$754,764,093      |

*\*Primarily the result of lower normal cost due to lower salaries and Tier 2 members replacing Tier 1 members.*

**SECTION 2: Valuation Results for the Public School Teachers' Pension and Retirement Fund of Chicago**

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The total amount of OPEB payments in any year may not exceed 75% of the total cost of health insurance coverage in that year for all recipients who receive payments in that year. Total payments may not exceed \$65,000,000 plus any amount that was authorized to be paid in the preceding year but was not actually paid (including any interest earned).

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**CHART 15**  
**OPEB Funding**

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|  | <b>2016</b>  | <b>2015</b>  |
|--|--------------|--------------|
| <b>Contributions for the plan year beginning July 1:</b> |              |              |
| Expected employer contributions                          | \$65,000,000 | \$65,000,000 |
| Actual employer contributions                            | --           | 65,000,000   |
| <b>Funding elements for plan year beginning July 1:</b>  |              |              |
| Employer normal cost, including administrative expenses  | \$65,000,000 | \$65,000,000 |
| Market value of assets                                   | 20,229,722   | 21,713,159   |

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**SECTION 3: Supplemental Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

**EXHIBIT A**

**Table of Plan Coverage**

| <b>Category</b>  | <b>Year Ended June 30</b> |                 | <b>Change From Prior Year</b> |
|--|---------------------------|-----------------|-------------------------------|
|  | <b>2016</b>               | <b>2015</b>     |                               |
| <b>Active participants in valuation:</b>                 |                           |                 |                               |
| Number   | 29,543                    | 29,706          | -0.5%                         |
| Average age  | 41.5                      | 41.4            | N/A                           |
| Average years of service                                 | 10.4                      | 10.3            | N/A                           |
| Total salary supplied by the Fund                        | \$2,071,040,979           | \$2,155,604,327 | -3.9%                         |
| Average salary   | \$70,103                  | \$72,565        | -3.4%                         |
| Total active vested participants                         | 18,557                    | 19,213          | -3.4%                         |
| Male participants  | 7,077                     | 7,033           | 0.6%                          |
| Female participants                                      | 22,466                    | 22,673          | -0.9%                         |
| Tier 1 participants                                      | 21,620                    | 22,857          | -5.4%                         |
| Tier 2 participants                                      | 7,923                     | 6,849           | 15.7%                         |
| <b>Vested terminated participants</b>                    | <b>5,715</b>              | <b>5,464</b>    | <b>4.6%</b>                   |
| <b>Non-vested terminated participants</b>                | <b>22,042</b>             | <b>21,365</b>   | <b>3.2%</b>                   |
| <b>Service retirees:</b>                                 |                           |                 |                               |
| Number in pay status                                     | 24,732                    | 24,594          | 0.6%                          |
| Average age  | 73.3                      | 72.9            | N/A                           |
| Average monthly benefit                                  | \$4,310                   | \$4,206         | 2.5%                          |
| Total annual benefit                                     | \$1,279,157,562           | \$1,241,262,452 | 3.1%                          |
| <b>Disabled retirees:</b>                                |                           |                 |                               |
| Number in pay status                                     | 476                       | 470             | 1.3%                          |
| Average age  | 66.6                      | 66.2            | N/A                           |
| Average monthly benefit                                  | \$2,954                   | \$2,901         | 1.8%                          |
| Total annual benefit                                     | \$16,872,644              | \$16,364,372    | 3.1%                          |
| <b>Beneficiaries (including children) in pay status:</b> |                           |                 |                               |
| Number in pay status                                     | 3,090                     | 3,050           | 1.3%                          |
| Average age  | 76.0                      | 75.6            | N/A                           |
| Average monthly benefit                                  | \$1,776                   | \$1,700         | 4.5%                          |
| Total annual benefit                                     | \$65,852,350              | \$62,237,560    | 5.8%                          |
| <b>Total number of participants*</b>                     | <b>85,598</b>             | <b>84,649</b>   | <b>1.1%</b>                   |

\*There were 18,063 retirees and beneficiaries receiving health insurance subsidies as of June 30, 2016, and 17,490 as of June 30, 2015.

**SECTION 3: Supplemental Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

**EXHIBIT B**

**Participants in Active Service as of June 30, 2016  
By Age, Years of Service, and Average Salary**

| Age       | Years of Service |          |          |          |          |          |           |           |           |           |           |
|-----------|------------------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|
|           | Total            | <1       | 1-4      | 5-9      | 10-14    | 15-19    | 20-24     | 25-29     | 30-34     | 35-39     | 40 & over |
| Under 25  | 911              | 225      | 686      | --       | --       | --       | --        | --        | --        | --        | --        |
|           | \$41,113         | \$14,116 | \$49,967 | --       | --       | --       | --        | --        | --        | --        | --        |
| 25-29     | 4,196            | 383      | 3,223    | 590      | --       | --       | --        | --        | --        | --        | --        |
|           | \$50,792         | 13,915   | 53,071   | \$62,285 | --       | --       | --        | --        | --        | --        | --        |
| 30-34     | 5,100            | 234      | 2,143    | 2,226    | 497      | --       | --        | --        | --        | --        | --        |
|           | \$61,363         | 12,920   | 54,886   | 68,241   | \$81,290 | --       | --        | --        | --        | --        | --        |
| 35-39     | 4,648            | 161      | 987      | 1,300    | 1,807    | 393      | --        | --        | --        | --        | --        |
|           | \$72,277         | 11,679   | 53,841   | 70,394   | 84,466   | \$93,585 | --        | --        | --        | --        | --        |
| 40-44     | 3,939            | 121      | 586      | 691      | 1,075    | 1,170    | 296       | --        | --        | --        | --        |
|           | \$79,776         | 8,940    | 53,587   | 70,882   | 85,764   | 94,631   | \$100,882 | --        | --        | --        | --        |
| 45-49     | 3,572            | 119      | 413      | 466      | 632      | 865      | 894       | 183       | --        | --        | --        |
|           | \$82,263         | 8,703    | 51,642   | 69,147   | 84,644   | 91,648   | 97,813    | \$104,053 | --        | --        | --        |
| 50-54     | 2,683            | 95       | 282      | 247      | 403      | 505      | 614       | 432       | 103       | 2         | --        |
|           | \$82,444         | 10,131   | 53,135   | 64,366   | 83,526   | 89,922   | 93,898    | 96,975    | \$102,320 | \$97,886  | --        |
| 55-59     | 2,436            | 99       | 207      | 222      | 336      | 418      | 491       | 340       | 299       | 24        | --        |
|           | \$80,091         | 8,799    | 43,838   | 58,049   | 77,734   | 87,407   | 91,281    | 94,889    | 100,058   | 109,040   | --        |
| 60-64     | 1,376            | 68       | 139      | 135      | 200      | 240      | 251       | 163       | 116       | 49        | 15        |
|           | \$76,587         | 7,130    | 37,508   | 50,254   | 74,246   | 88,075   | 91,107    | 96,226    | 101,932   | 101,829   | \$103,214 |
| 65-69     | 536              | 52       | 66       | 65       | 69       | 74       | 77        | 54        | 43        | 12        | 24        |
|           | \$64,280         | 5,827    | 24,377   | 41,004   | 57,329   | 77,033   | 92,516    | 94,451    | 97,748    | 106,927   | 104,605   |
| 70 & over | 146              | 14       | 23       | 26       | 18       | 22       | 13        | 10        | 7         | 5         | 8         |
|           | \$50,334         | 4,444    | 14,368   | 20,303   | 54,055   | 63,949   | 80,769    | 101,700   | 91,660    | 97,276    | 106,668   |
| Total     | 29,543           | 1,571    | 8,755    | 5,968    | 5,037    | 3,687    | 2,636     | 1,182     | 568       | 92        | 47        |
|           | \$70,103         | \$11,591 | \$52,545 | \$67,046 | \$83,042 | \$91,393 | \$95,152  | \$97,292  | \$100,573 | \$104,042 | \$104,512 |

**SECTION 3: Supplemental Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

**EXHIBIT C**

**Reconciliation of Participant Data**

|  | <b>Active<br/>Participants</b> | <b>Vested<br/>Former<br/>Participants</b> | <b>Non-Vested<br/>Former<br/>Participants</b> | <b>Retirees</b> | <b>Disabled<br/>Retirees</b> | <b>Beneficiaries</b> | <b>Total</b> |
|--|--------------------------------|---|---|-----------------|------------------------------|----------------------|--------------|
| Number as of June 30, 2015                         | 29,706                         | 5,464                                     | 21,365  | 24,594          | 470                          | 3,050                | 84,649       |
| New participants                                   | 2,780                          | N/A                                       | N/A   | N/A             | N/A                          | N/A                  | 2,780        |
| Terminations – with vested rights                  | -816                           | 816                                       | N/A   | 0               | 0                            | 0                    | 0            |
| Terminations – without vested rights               | -1,677                         | N/A                                       | 1,677   | N/A             | N/A                          | N/A                  | 0            |
| Retirements  | -614                           | -200                                      | N/A   | 814             | N/A                          | N/A                  | 0            |
| New disabilities                                   | -7                             | -14                                       | N/A   | N/A             | 21                           | N/A                  | 0            |
| Conversion from duty disability to service pension | N/A                            | N/A                                       | N/A   | -1              | 1                            | N/A                  | 0            |
| New beneficiaries                                  | N/A                            | N/A                                       | N/A   | N/A             | N/A                          | 227                  | 227          |
| Deaths   | -43                            | -16                                       | -37   | -713            | -15                          | -187                 | -1,011       |
| Refunds  | -408                           | -168                                      | -757  | 0               | 0                            | 0                    | -1,333       |
| Rehire   | 622                            | -198                                      | -424  | 0               | N/A                          | N/A                  | 0            |
| Certain period expired                             | N/A                            | N/A                                       | N/A   | 0               | 0                            | 0                    | 0            |
| Data adjustments                                   | <u>0</u>                       | <u>31</u>                                 | <u>218</u>                                    | <u>38</u>       | <u>-1</u>                    | <u>0</u>             | <u>286</u>   |
| Number as of June 30, 2016                         | 29,543                         | 5,715                                     | 22,042  | 24,732          | 476                          | 3,090                | 85,598       |

**SECTION 3: Supplemental Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

**EXHIBIT D**

**Schedule of Retirees and Beneficiaries Added to and Removed from Rolls**

| <u>Fiscal Year</u> | <u>Added to Rolls</u> |                          | <u>Removed from Rolls</u> |                          | <u>Rolls – End of Year</u> |                          | <u>Average Annual Allowances</u> | <u>% Increase in Avg. Annual Allowances</u> |
|--------------------|-----------------------|--------------------------|---------------------------|--------------------------|----------------------------|--------------------------|----------------------------------|---|
|                    | <u>Number</u>         | <u>Annual Allowances</u> | <u>Number</u>             | <u>Annual Allowances</u> | <u>Number</u>              | <u>Annual Allowances</u> |                                  |   |
| 2006               | 1,788                 | \$91,991,917             | 637                       | \$15,910,849             | 22,105                     | \$764,340,586            | 34,578                           | 5.3   |
| 2007               | 2,055                 | 104,043,221              | 537                       | 14,063,967               | 23,623                     | 854,319,840              | 36,165                           | 4.6   |
| 2008               | 881                   | 67,060,461               | 584                       | 16,543,468               | 23,920                     | 904,836,833              | 37,828                           | 4.6   |
| 2009               | 957                   | 57,109,256               | 659                       | 19,557,718               | 24,218                     | 942,388,371              | 38,913                           | 2.9   |
| 2010               | 1,080                 | 67,630,266               | 698                       | 21,855,794               | 24,600                     | 988,162,843              | 40,169                           | 3.2   |
| 2011               | 1,394                 | 86,404,558               | 795                       | 26,694,342               | 25,199                     | 1,047,873,059            | 41,584                           | 3.5   |
| 2012               | 1,579                 | 96,719,811               | 852                       | 28,511,983               | 25,926                     | 1,116,080,887            | 43,049                           | 3.5   |
| 2013               | 2,129                 | 130,553,477              | 615                       | 21,764,846               | 27,440                     | 1,224,869,518            | 44,638                           | 3.7   |
| 2014               | 1,006                 | 70,963,133               | 724                       | 26,376,522               | 27,722                     | 1,269,456,130            | 45,792                           | 2.6   |
| 2015               | 1,302                 | 85,087,053               | 910                       | 34,678,799               | 28,114                     | 1,319,864,384            | 46,947                           | 2.5   |
| 2016               | 1,101                 | 78,909,433               | 917                       | 36,891,261               | 28,298                     | 1,361,882,556            | 48,126                           | 2.5   |

**SECTION 3: Supplemental Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

**EXHIBIT E.1**

**Distribution of Current Annuitants by Benefit Type and Amount as of June 30, 2016**

| <b>Monthly Pension Amount</b> | <b>Retirees</b> |               | <b>Disabled Retirees</b> |               | <b>Beneficiaries</b> |               | <b>Total</b> |               |
|-------------------------------|-----------------|---------------|--------------------------|---------------|----------------------|---------------|--------------|---------------|
|                               | <b>Male</b>     | <b>Female</b> | <b>Male</b>              | <b>Female</b> | <b>Male</b>          | <b>Female</b> | <b>Male</b>  | <b>Female</b> |
| \$0 - 499                     | 393             | 994           | 1                        | 1             | 158                  | 247           | 552          | 1,242         |
| \$500 - 999                   | 381             | 888           | 6                        | 14            | 225                  | 371           | 612          | 1,273         |
| \$1,000 - 1,499               | 328             | 675           | 15                       | 36            | 151                  | 205           | 494          | 916           |
| \$1,500 - 1,999               | 236             | 641           | 9                        | 49            | 177                  | 250           | 422          | 940           |
| \$2,000 - 2,499               | 239             | 762           | 12                       | 46            | 157                  | 264           | 408          | 1,072         |
| \$2,500 - 2,999               | 257             | 939           | 13                       | 50            | 200                  | 339           | 470          | 1,328         |
| \$3,000 - 3,499               | 313             | 1,101         | 19                       | 39            | 31                   | 112           | 363          | 1,252         |
| \$3,500 - 3,999               | 319             | 1,376         | 13                       | 46            | 16                   | 70            | 348          | 1,492         |
| \$4,000 - 4,499               | 360             | 1,286         | 9                        | 44            | 13                   | 47            | 382          | 1,377         |
| \$4,500 - 4,999               | 583             | 1,715         | 4                        | 26            | 5                    | 25            | 592          | 1,766         |
| \$5,000 - 5,499               | 868             | 2,731         | 2                        | 7             | 4                    | 16            | 874          | 2,754         |
| \$5,500 - 5,999               | 807             | 2,472         | 1                        | 5             | 2                    | 2             | 810          | 2,479         |
| \$6,000 - 6,499               | 355             | 1,074         | 1                        | 0             | 0                    | 1             | 356          | 1,075         |
| \$6,500 - 6,999               | 224             | 447           | 1                        | 2             | 0                    | 0             | 225          | 449           |
| \$7,000 - 7,499               | 193             | 270           | 1                        | 2             | 0                    | 0             | 194          | 272           |
| \$7,500 - 7,999               | 103             | 218           | 1                        | 0             | 0                    | 0             | 104          | 218           |
| \$8,000 - 8,499               | 94              | 200           | 1                        | 0             | 1                    | 0             | 96           | 200           |
| \$8,500 - 8,999               | 83              | 148           | 0                        | 0             | 0                    | 0             | 83           | 148           |
| \$9,000 & over                | <u>233</u>      | <u>426</u>    | <u>0</u>                 | <u>0</u>      | <u>0</u>             | <u>1</u>      | <u>233</u>   | <u>427</u>    |
| Total                         | 6,369           | 18,363        | 109                      | 367           | 1,140                | 1,950         | 7,618        | 20,680        |

**SECTION 3: Supplemental Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

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**EXHIBIT E.2**

**Distribution of Current Annuitants with Health Insurance Reimbursements by Benefit Amount as of June 30, 2016**

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| <u>Monthly Pension Amount</u> | <u>Health Insurance</u> |               |
|-------------------------------|-------------------------|---------------|
|                               | <u>Male</u>             | <u>Female</u> |
| \$0 - 499                     | 53                      | 124           |
| \$500 - 999                   | 99                      | 317           |
| \$1,000 - 1,499               | 144                     | 298           |
| \$1,500 - 1,999               | 138                     | 432           |
| \$2,000 - 2,499               | 153                     | 571           |
| \$2,500 - 2,999               | 190                     | 816           |
| \$3,000 - 3,499               | 210                     | 831           |
| \$3,500 - 3,999               | 229                     | 1,032         |
| \$4,000 - 4,499               | 277                     | 1,023         |
| \$4,500 - 4,999               | 464                     | 1,411         |
| \$5,000 - 5,499               | 737                     | 2,283         |
| \$5,500 - 5,999               | 673                     | 2,100         |
| \$6,000 - 6,499               | 308                     | 885           |
| \$6,500 - 6,999               | 190                     | 382           |
| \$7,000 - 7,499               | 169                     | 240           |
| \$7,500 - 7,999               | 86                      | 182           |
| \$8,000 - 8,499               | 84                      | 169           |
| \$8,500 - 8,999               | 73                      | 130           |
| \$9,000 & over                | <u>197</u>              | <u>363</u>    |
| Total                         | 4,474                   | 13,589        |

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**SECTION 3: Supplemental Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

**EXHIBIT F  
Schedule of Average Benefit Payments**

|                                | Years of Credited Service |         |         |         |         |         |         | Total   |
|--------------------------------|---------------------------|---------|---------|---------|---------|---------|---------|---------|
|                                | 0-4                       | 5-9     | 10-14   | 15-19   | 20-24   | 25-29   | 30+     |         |
| <b>Fiscal Year 2012</b>        |                           |         |         |         |         |         |         |         |
| Average Monthly Pension        | \$348                     | \$842   | \$1,452 | \$2,522 | \$3,308 | \$4,142 | \$5,788 | \$3,846 |
| Average Final Salary           | \$6,690                   | \$5,457 | \$5,509 | \$6,696 | \$7,049 | \$7,173 | \$7,887 | \$7,114 |
| Number of Retired Participants | 72                        | 114     | 84      | 134     | 221     | 157     | 538     | 1,320   |
| Average Age                    |                           |         |         |         |         |         |         | 63.2    |
| <b>Fiscal Year 2013</b>        |                           |         |         |         |         |         |         |         |
| Average Monthly Pension        | \$275                     | \$856   | \$1,645 | \$2,761 | \$3,567 | \$4,422 | \$5,976 | \$4,294 |
| Average Final Salary           | \$5,623                   | \$5,491 | \$6,180 | \$7,136 | \$7,495 | \$7,688 | \$8,157 | \$7,535 |
| Number of Retired Participants | 56                        | 114     | 91      | 186     | 380     | 256     | 824     | 1,907   |
| Average Age                    |                           |         |         |         |         |         |         | 63.2    |
| <b>Fiscal Year 2014</b>        |                           |         |         |         |         |         |         |         |
| Average Monthly Pension        | \$262                     | \$758   | \$1,648 | \$2,581 | \$3,477 | \$4,307 | \$5,683 | \$3,217 |
| Average Final Salary           | \$6,555                   | \$5,023 | \$6,309 | \$6,657 | \$7,376 | \$7,516 | \$7,823 | \$6,958 |
| Number of Retired Participants | 46                        | 89      | 74      | 102     | 184     | 120     | 145     | 760     |
| Average Age                    |                           |         |         |         |         |         |         | 63.4    |
| <b>Fiscal Year 2015</b>        |                           |         |         |         |         |         |         |         |
| Average Monthly Pension        | \$275                     | \$877   | \$1,606 | \$2,621 | \$3,530 | \$4,254 | \$5,561 | \$3,398 |
| Average Final Salary           | \$6,587                   | \$5,377 | \$5,891 | \$6,851 | \$7,555 | \$7,483 | \$7,762 | \$7,077 |
| Number of Retired Participants | 47                        | 104     | 117     | 107     | 269     | 172     | 240     | 1,056   |
| Average Age                    |                           |         |         |         |         |         |         | 63.2    |
| <b>Fiscal Year 2016</b>        |                           |         |         |         |         |         |         |         |
| Average Monthly Pension        | \$326                     | \$840   | \$1,493 | \$2,432 | \$3,440 | \$4,294 | \$5,701 | \$3,286 |
| Average Final Salary           | \$7,267                   | \$5,266 | \$5,627 | \$6,515 | \$7,301 | \$7,711 | \$8,026 | \$7,054 |
| Number of Retired Participants | 61                        | 92      | 77      | 113     | 184     | 123     | 202     | 852     |
| Average Age                    |                           |         |         |         |         |         |         | 63.1    |

*Table does not include disabled participants or surviving spouses.*

**SECTION 3: Supplemental Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

**EXHIBIT G**

**Summary Statement of Income and Expenses on a Market Value Basis**

|  | Year Ended June 30, 2016 | Year Ended June 30, 2015 |
|--|--------------------------|--------------------------|
| <b>Net assets at market value at the beginning of the year</b> | \$10,711,667,479         | \$10,851,672,058         |
| <b>Contribution income:</b>                                    |                          |                          |
| Employer contributions   | \$700,070,000            | \$708,667,000            |
| Employee contributions   | 191,882,430              | 191,233,298              |
| Pension administrative expenses                                | -12,298,862              | -11,705,562              |
| OPEB administrative expenses                                   | <u>-568,628</u>          | <u>0</u>                 |
| Net contribution income  | 879,084,940              | 888,194,736              |
| <b>Miscellaneous income</b>                                    | 1,463,050                | 943,946                  |
| <b>Investment income:</b>                                      |                          |                          |
| Interest, dividends and other income                           | \$241,738,870            | \$250,256,690            |
| Asset appreciation   | -238,462,924             | 187,218,929              |
| Securities lending income                                      | 4,498,713                | -17,725,693              |
| Less investment and custodial fees                             | <u>-35,761,822</u>       | <u>-38,009,628</u>       |
| Net investment income  | <u>-27,987,163</u>       | <u>381,740,298</u>       |
| <b>Total income available for benefits</b>                     | \$852,560,827            | \$1,270,878,980          |
| <b>Less benefit payments:</b>                                  |                          |                          |
| Annuity payments   | -\$1,346,533,282         | -\$1,304,494,978         |
| Refund of insurance premiums                                   | -66,104,598              | -79,316,153              |
| Refund of contributions  | -33,575,599              | -23,879,796              |
| Death benefits   | <u>-4,717,517</u>        | <u>-3,192,632</u>        |
| Net benefit payments   | -\$1,450,930,996         | -\$1,410,883,559         |
| <b>Change in reserve for future benefits</b>                   | -\$598,370,169           | -\$140,004,579           |
| <b>Net assets at market value at the end of the year</b>       | \$10,113,297,310         | \$10,711,667,479         |

**SECTION 3: Supplemental Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

**EXHIBIT H**

**Summary Statement of Plan Assets**

|   | <b>Year Ended June 30, 2016</b> | <b>Year Ended June 30, 2015</b> |
|---|---------------------------------|---------------------------------|
| <b>Cash equivalents</b>                       | \$15,802,244                    | \$653,289,409                   |
| <b>Accounts receivable</b>                    | 170,132,698                     | 183,477,636                     |
| <b>Investments, at fair value:</b>            |                                 |                                 |
| Equities                                      | \$5,070,733,909                 | \$5,637,712,550                 |
| Fixed income                                  | 1,983,004,015                   | 1,904,385,564                   |
| Commingled funds                              | 1,213,578,214                   | 1,301,799,976                   |
| Short-term investments                        | 1,016,270,961                   | 359,908,522                     |
| Private equity                                | 287,138,325                     | 314,350,916                     |
| Real estate                                   | 214,520,130                     | 266,567,126                     |
| Public REITs                                  | 166,279,865                     | 143,138,024                     |
| Infrastructure                                | 140,760,076                     | 107,591,285                     |
| Margin cash                                   | <u>3,870,883</u>                | <u>65,287</u>                   |
| Total investments at market value             | <u>10,096,156,378</u>           | <u>10,035,519,250</u>           |
| <b>Invested securities lending collateral</b> | 779,223,423                     | 485,612,851                     |
| <b>Capital assets</b>                         | 1,057,706                       | 1,003,753                       |
| <b>Prepaid expenses</b>                       | <u>96,590</u>                   | <u>13,815</u>                   |
| <b>Total assets</b>                           | 11,062,469,039                  | \$11,358,916,714                |
| <b>Less accounts payable:</b>                 |                                 |                                 |
| Benefits payable                              | -\$12,318,929                   | -\$3,058,200                    |
| Refunds payable                               | -10,583,451                     | -8,462,208                      |
| Accounts and administrative expenses payable  | -8,710,778                      | -14,691,791                     |
| Securities lending collateral                 | -788,355,965                    | -499,244,106                    |
| Due to brokers for securities purchased       | <u>-129,202,606</u>             | <u>-121,792,930</u>             |
| Total accounts payable                        | -\$949,171,729                  | -\$647,249,235                  |
| <b>Net assets at market value</b>             | <u>\$10,113,297,310</u>         | <u>\$10,711,667,479</u>         |
| <b>Net assets at actuarial value</b>          | <u>\$10,630,976,553</u>         | <u>\$10,366,088,281</u>         |

**SECTION 3: Supplemental Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

**EXHIBIT I.1**

**Development of the Fund Through June 30, 2016 (Pension)**

| <b>Year Ended<br/>June 30</b> | <b>Employer<br/>Contributions</b> | <b>Employee<br/>Contributions</b> | <b>Net<br/>Investment<br/>Return*</b> | <b>Miscellaneous</b> | <b>Administrative<br/>Expenses</b> | <b>Benefit<br/>Payments</b> | <b>Actuarial<br/>Value of<br/>Assets at<br/>End of Year</b> |
|-------------------------------|-----------------------------------|-----------------------------------|---------------------------------------|----------------------|------------------------------------|-----------------------------|---|
| 2007                          | \$103,761,750                     | \$179,017,663                     | \$1,415,420,214                       | \$1,923              | \$8,434,688                        | \$837,008,647               | \$11,759,699,063  |
| 2008                          | 164,270,412                       | 172,504,804                       | 905,021,878                           | 0                    | 7,827,576                          | 924,251,543                 | 12,069,417,038  |
| 2009                          | 198,069,327                       | 176,176,975                       | 21,935,841                            | 0                    | 8,751,945                          | 963,591,482                 | 11,493,255,754  |
| 2010                          | 290,759,950                       | 194,621,551                       | -39,885,503                           | 0                    | 8,800,848                          | 1,012,533,911               | 10,917,416,993  |
| 2011                          | 143,589,994                       | 185,882,636                       | -50,121,733                           | 55,307               | 9,527,938                          | 1,077,980,337               | 10,109,314,922  |
| 2012                          | 138,729,011                       | 187,141,384                       | 92,083,763                            | 431,790              | 10,120,434                         | 1,153,503,764               | 9,364,076,672   |
| 2013                          | 142,654,000                       | 188,356,294                       | 996,069,982                           | 0                    | 11,537,394                         | 1,257,100,364               | 9,422,519,190   |
| 2014                          | 585,416,141                       | 187,846,065                       | 1,166,597,174                         | 0                    | 10,494,139                         | 1,306,341,856               | 10,045,542,575  |
| 2015                          | 643,667,000                       | 191,233,298                       | 806,261,271                           | 943,946              | 11,705,562                         | 1,331,567,406               | 10,344,375,122  |
| 2016                          | 635,070,000                       | 191,882,430                       | 835,081,489                           | 1,463,050            | 12,298,862                         | 1,384,826,398               | 10,610,746,831  |

\* Net of investment fees

**SECTION 3: Supplemental Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

**EXHIBIT I.2**

**Development of the Fund Through June 30, 2016 (OPEB)**

| <b>Year Ended<br/>June 30</b> | <b>Employer<br/>Contributions</b> | <b>Employee<br/>Contributions</b> | <b>Net<br/>Investment<br/>Return*</b> | <b>Miscellaneous</b> | <b>Administrative<br/>Expenses</b> | <b>Benefit<br/>Payments</b> | <b>Actuarial<br/>Value of<br/>Assets at<br/>End of Year</b> |
|-------------------------------|-----------------------------------|-----------------------------------|---------------------------------------|----------------------|------------------------------------|-----------------------------|---|
| 2007                          | \$65,000,000                      | \$0                               | \$2,373,014                           | \$0                  | \$0                                | \$61,028,841                | \$47,401,758  |
| 2008                          | 65,000,000                        | 0                                 | 1,278,818                             | 0                    | 0                                  | 68,691,191                  | 44,989,385  |
| 2009                          | 65,000,000                        | 0                                 | 514,200                               | 15,000,000           | 0                                  | 75,811,835                  | 49,691,750  |
| 2010                          | 65,000,000                        | 0                                 | 119,855                               | 0                    | 0                                  | 79,953,873                  | 34,857,732  |
| 2011                          | 65,000,000                        | 0                                 | 20,471                                | 10,338,661           | 0                                  | 78,892,292                  | 31,324,572  |
| 2012                          | 65,000,000                        | 0                                 | 41,058                                | 6,770,651            | 0                                  | 69,011,323                  | 34,124,958  |
| 2013                          | 65,000,000                        | 0                                 | 82,822                                | 8,352,647            | 0                                  | 71,763,523                  | 35,796,904  |
| 2014                          | 65,000,000                        | 0                                 | 55,134                                | 8,000,000            | 0                                  | 72,874,594                  | 35,977,444  |
| 2015                          | 65,000,000                        | 0                                 | 51,868                                | 0                    | 0                                  | 79,316,153                  | 21,713,159  |
| 2016                          | 65,000,000                        | 0                                 | 189,789                               | 0                    | 568,628                            | 66,104,598                  | 20,229,722  |

\* Net of investment fees

**SECTION 3: Supplemental Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

**EXHIBIT J**

**Development of Unfunded Actuarial Accrued Liability**

|  | Year Ending June 30    |                        |
|--|------------------------|------------------------|
|  | 2016                   | 2015                   |
| 1. Unfunded actuarial accrued liability at beginning of year             | \$9,585,201,693        | \$9,422,373,613        |
| 2. Normal cost at beginning of year                                      | 386,054,314            | 387,497,642            |
| 3. Total contributions   | 891,952,430            | 899,900,298            |
| 4. Interest  |                        |                        |
| (a) Unfunded actuarial accrued liability and normal cost                 | \$772,772,341          | \$760,265,022          |
| (b) Total contributions  | <u>6,723,973</u>       | <u>6,701,226</u>       |
| (c) Total interest: (4a) – (4b)  | <u>766,048,368</u>     | <u>753,563,796</u>     |
| 5. Expected unfunded actuarial accrued liability: (1) + (2) – (3) + (4c) | \$9,845,351,945        | \$9,663,534,753        |
| 6. Changes due to (gain)/loss from:                                      |                        |                        |
| (a) Investments  | -\$81,129,490          | -\$45,212,951          |
| (b) Demographics and other   | <u>-149,058,710</u>    | <u>-33,120,109</u>     |
| (c) Total changes due to (gain)/loss: (6a) + (6b)                        | <u>-230,188,200</u>    | <u>-78,333,060</u>     |
| 7. Change to due plan changes  | 0                      | 0                      |
| 8. Change in actuarial assumptions                                       | <u>0</u>               | <u>0</u>               |
| 9. Unfunded accrued liability at end of year: (5) + (6c) + (7) + (8)     | <u>\$9,615,163,745</u> | <u>\$9,585,201,693</u> |

### SECTION 3: Supplemental Information for the Public School Teachers' Pension and Retirement Fund of Chicago

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#### EXHIBIT K

#### Definitions of Terms

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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., CTPF's assets earn more than projected, salary increases are less than assumed, participants 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.

### SECTION 3: Supplemental Information for the Public School Teachers' Pension and Retirement Fund of Chicago

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**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 participant, retired participants, beneficiaries receiving benefits, and inactive participants 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.



### SECTION 3: Supplemental Information for the Public School Teachers' Pension and Retirement Fund of Chicago

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**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 participants 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.

### SECTION 3: Supplemental Information for the Public School Teachers' Pension and Retirement Fund of Chicago

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|                                   |   |
|-----------------------------------|---|
| <b>Decrements:</b>                | Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or termination.   |
| <b>Defined Benefit Plan:</b>      | A retirement plan in which benefits are defined by a formula applied to the member's compensation and/or years of service.  |
| <b>Defined Contribution Plan:</b> | 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.  |
| <b>Employer Normal Cost:</b>      | The portion of the Normal Cost to be paid by the employers. This is equal to the Normal Cost less expected member contributions.  |
| <b>Experience Study:</b>          | 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.  |
| <b>Funded Ratio:</b>              | The ratio of the actuarial value of assets (AVA) to the actuarial accrued liability (AAL). Plans sometimes calculate a market funded ratio, using the market value of assets (MVA), rather than the AVA, as another measure of the Plan's health.   |
| <b>GASB 25 and GASB 27:</b>       | Governmental Accounting Standards Board Statements No. 25 and No. 27. 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. 27 sets the accounting rules for the employers that sponsor or contribute to public retirement systems, while Statement No. 25 sets the rules for the systems themselves.   |
| <b>GASB 43 and GASB 45:</b>       | Governmental Accounting Standards Board Statements No. 43 and No. 45. These are the governmental accounting standards that set the accounting rules for public postemployment benefit plans other than pension plans and the employers that sponsor or contribute to them. Statement No. 45 sets the accounting rules for the employers that sponsor or contribute to public postemployment benefit plans other than pension plans, while Statement No. 43 sets the rules for the plans themselves. |
| <b>GASB 67 and GASB 68:</b>       | Governmental Accounting Standards Board Statements No. 67 and No. 68 are the successor statements to GASB Statements No. 25 and No. 27.   |

### SECTION 3: Supplemental Information for the Public School Teachers' Pension and Retirement Fund of Chicago

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|   |   |
|---|---|
| <b>GASB 74 and GASB 75:</b>                         | Governmental Accounting Standards Board Statements No. 74 and No. 75 are the successor statements to GASB Statements No. 43 and No. 45.   |
| <b>Investment Return (Discount Rate):</b>           | 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. If the plan is funded on a pay-as-you go basis, the discount rate is tied to the expected rate of return on day-to-day employer funds.                                  |
| <b>Net Pension Liability (NPL):</b>                 | The Net Pension Liability is equal to the Total Pension Liability minus the Plan Fiduciary Net Position.  |
| <b>Normal Cost:</b>                                 | That portion of the Actuarial Present Value of 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.  |
| <b>Open Amortization Period:</b>                    | 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 is used to amortize the Unfunded Actuarial Accrued Liability, the UAAL will never completely disappear, but will become smaller each year, either as a dollar amount, or in relation to covered payroll, if the actuarial assumptions are realized. |
| <b>Plan Fiduciary Net Position:</b>                 | Market value of assets.   |
| <b>Total Pension Liability (TPL):</b>               | 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.   |
| <b>Unfunded Actuarial Accrued Liability (UAAL):</b> | 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.   |

**SECTION 3: Supplemental Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

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**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.

**SECTION 4: Valuation Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

**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 3,090 beneficiaries and 476 disabled retirees)        |        | 28,298 |
| Pensioners receiving health insurance subsidies as of the valuation date                                | 18,063 |        |
| Pensioners not receiving health insurance subsidies as of the valuation date                            | 10,235 |        |
| 2. Participants inactive during year ended June 30, 2016 with vested rights                             |        | 5,715  |
| 3. Participants inactive during the year ended June 30, 2016 entitled only to a refund of contributions |        | 22,042 |
| 4. Participants active during the year ended June 30, 2016  |        | 29,543 |
| Fully vested  | 18,557 |        |
| Not vested  | 10,986 |        |

The actuarial factors as of the valuation date are as follows:

|  |                   |                  |
|--|-------------------|------------------|
| 1. Actuarial accrued liability                                   |                   | \$20,246,140,298 |
| Service retirees   | \$14,220,216,490  |                  |
| Disabled retirees  | 182,512,233       |                  |
| Beneficiaries  | 562,779,499       |                  |
| Inactive participants  | 538,876,849       |                  |
| Active participants:   |                   |                  |
| Retirement   | 4,085,990,305     |                  |
| Turnover   | 463,020,338       |                  |
| Mortality  | 99,249,586        |                  |
| Disability   | <u>93,494,998</u> |                  |
| Total  | 4,741,755,227     |                  |
| 2. Actuarial value of assets (\$10,093,067,588 at market value)* |                   | 10,610,746,831   |
| 3. Unfunded actuarial accrued liability: (1) – (2)               |                   | 9,635,393,467    |
| 4. Funded ratio: (2) ÷ (1)                                       |                   | 52.4%            |

*\*Excludes assets dedicated to retiree health insurance subsidies*

**SECTION 4: Valuation Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

**EXHIBIT I (continued)  
Summary of Actuarial Valuation Results**

| Components of normal cost:  | Tier 1              |                  | Tier 2              |                | Total                |                     |
|---|---------------------|------------------|---------------------|----------------|----------------------|---------------------|
|   | <u>% of Payroll</u> | <u>Amount</u>    | <u>% of Payroll</u> | <u>Amount</u>  | <u>% of Payroll*</u> | <u>Amount</u>       |
| 1. Retirement   | 12.71%              | \$227,474,499    | 1.75%               | \$7,636,239    | 10.56%               | \$235,110,738       |
| 2. Turnover   | 1.87%               | 33,401,248       | 2.83%               | 12,396,820     | 2.06%                | 45,798,068          |
| 3. Mortality  | 0.37%               | 6,558,664        | 0.16%               | 706,719        | 0.33%                | 7,265,383           |
| 4. Disability   | <u>0.33%</u>        | <u>5,952,324</u> | <u>0.19%</u>        | <u>822,950</u> | <u>0.30%</u>         | <u>6,775,274</u>    |
| 5. Total normal cost: (1) + (2) + (3) + (4)                               | 15.28%              | \$273,386,735    | 4.93%               | \$21,562,728   | 13.25%               | 294,949,463         |
| 6. Total normal cost, adjusted to the middle of the year                  |                     |                  |                     |                | 13.75%               | 306,165,499         |
| 7. Administrative expenses  |                     |                  |                     |                | <u>0.58%</u>         | <u>12,913,805</u>   |
| 8. Total normal cost, including administrative expenses: (6) + (7)        |                     |                  |                     |                | 14.33%               | \$319,079,304       |
| 9. Expected employee contributions  |                     |                  |                     |                | <u>-8.41%</u>        | <u>-187,335,273</u> |
| 10. Employer normal cost: (8) + (9)                                       |                     |                  |                     |                | 5.92%                | \$131,744,031       |
| 11. Employer normal cost, adjusted to the end of the year                 |                     |                  |                     |                | 6.14%                | 136,753,858         |
| 12. Health insurance reimbursement  |                     |                  |                     |                | <u>2.92%</u>         | <u>65,000,000</u>   |
| 13. Employer normal cost, including retiree health insurance: (11) + (12) |                     |                  |                     |                | 9.06%                | \$201,753,858       |

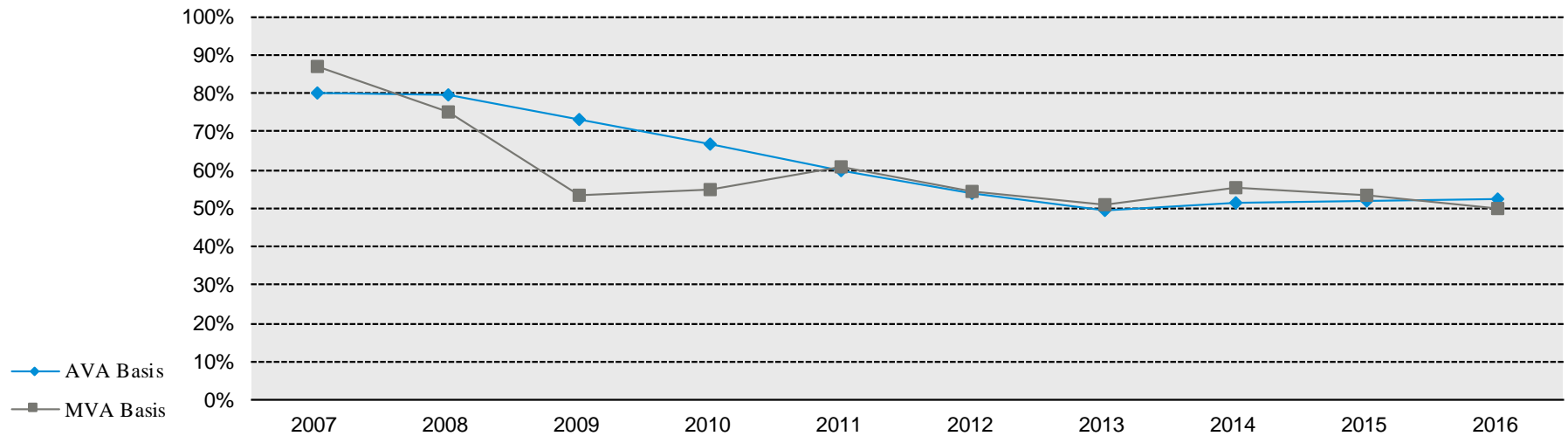
\* Based on projected payroll of \$2,227,208,231.

**SECTION 4: Valuation Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

**EXHIBIT II  
Funded Ratio**

A critical piece of information regarding the Fund's financial status is the funded ratio. This ratio compares the actuarial value of assets to the actuarial accrued liabilities of the Fund as calculated. High ratios indicate a well-funded plan with assets sufficient to cover the plan's actuarial accrued liabilities. Lower ratios may indicate recent changes to benefit structures, funding of the plan below actuarial requirements, poor asset performance, or a variety of other factors.

The chart below depicts a history of the funded ratios for this fund.



## **SECTION 4: Valuation Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

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### **EXHIBIT III**

#### **Projection of Contributions, Liabilities, and Assets**

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Based on the results of the June 30, 2016, actuarial valuation, we have projected valuation results for a 43-year period commencing with Fiscal Year 2017. We have based Board of Education contributions on the contribution requirements on the funding provision of Public Act 96-0889.

For purposes of the projections, all assets, contributions, and benefit payments, including amounts attributable to the retiree health insurance program, 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 43-year period from 2017 through 2059 by projecting the membership of the Fund over the 43-year period, taking into account the impact of new entrants into the Fund over the 43-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 43-year projection period. The results of our projections are shown on the following pages.



**SECTION 4: Valuation Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

**EXHIBIT III (continued)**

**Projection of Contributions, Liabilities, and Assets**

(Board of Education contributions are based on Public Act 96-0889)  
 (All dollar amounts are in millions. Actuarial Liability and asset figures as of end of year.)

| Fiscal Year | Employee Contributions | Required Employer Contributions | Additional State Contributions | Additional Board of Education Contributions <sup>1</sup> | Required Board of Education Contributions <sup>1</sup> | Pensionable Payroll | Total Actuarial Liability | Actuarial Value of Assets | Unfunded Actuarial Liability | Funded Ratio |
|-------------|------------------------|---------------------------------|--------------------------------|--|--|---------------------|---------------------------|---------------------------|------------------------------|--------------|
| 2017        | 187.3                  | 745.4                           | 12.2                           | 13.0   | 720.2  | 2,227.2             | 20,680.4                  | 10,812.6                  | 9,867.8                      | 52.3%        |
| 2018        | 193.4                  | 784.4                           | 11.7                           | 12.5   | 760.2  | 2,299.7             | 21,128.4                  | 10,769.5                  | 10,359.0                     | 51.0%        |
| 2019        | 199.7                  | 809.8                           | 12.1                           | 12.9   | 784.9  | 2,374.2             | 21,593.2                  | 10,808.3                  | 10,784.9                     | 50.1%        |
| 2020        | 206.0                  | 835.5                           | 12.5                           | 13.3   | 809.8  | 2,449.5             | 22,075.9                  | 11,047.3                  | 11,028.6                     | 50.0%        |
| 2021        | 212.5                  | 861.8                           | 12.8                           | 13.7   | 835.2  | 2,526.6             | 22,577.2                  | 11,317.1                  | 11,260.1                     | 50.1%        |
| 2022        | 219.1                  | 888.6                           | 13.2                           | 14.1   | 861.2  | 2,605.1             | 23,098.6                  | 11,620.7                  | 11,477.9                     | 50.3%        |
| 2023        | 225.8                  | 915.8                           | 13.7                           | 14.6   | 887.6  | 2,685.0             | 23,641.4                  | 11,956.2                  | 11,685.2                     | 50.6%        |
| 2024        | 232.6                  | 943.4                           | 14.1                           | 15.0   | 914.3  | 2,765.8             | 24,206.5                  | 12,321.8                  | 11,884.7                     | 50.9%        |
| 2025        | 239.4                  | 970.9                           | 14.5                           | 15.4   | 941.0  | 2,846.5             | 24,793.8                  | 12,718.2                  | 12,075.6                     | 51.3%        |
| 2026        | 246.1                  | 997.8                           | 14.9                           | 15.9   | 967.1  | 2,925.5             | 25,403.5                  | 13,145.6                  | 12,257.9                     | 51.7%        |
| 2027        | 252.5                  | 1,023.9                         | 15.3                           | 16.3   | 992.4  | 3,001.9             | 26,033.4                  | 13,602.4                  | 12,431.0                     | 52.2%        |
| 2028        | 258.5                  | 1,048.4                         | 15.6                           | 16.7   | 1,016.1  | 3,073.6             | 26,683.6                  | 14,087.9                  | 12,595.7                     | 52.8%        |
| 2029        | 264.3                  | 1,071.6                         | 16.0                           | 17.0   | 1,038.6  | 3,141.9             | 27,352.0                  | 14,600.4                  | 12,751.6                     | 53.4%        |
| 2030        | 269.7                  | 1,093.9                         | 16.3                           | 17.4   | 1,060.2  | 3,207.0             | 28,037.0                  | 15,138.8                  | 12,898.2                     | 54.0%        |
| 2031        | 275.0                  | 1,115.3                         | 16.6                           | 17.7   | 1,081.0  | 3,269.9             | 28,736.4                  | 15,701.7                  | 13,034.7                     | 54.6%        |
| 2032        | 280.2                  | 1,136.3                         | 16.9                           | 18.1   | 1,101.3  | 3,331.5             | 29,449.3                  | 16,289.2                  | 13,160.1                     | 55.3%        |
| 2033        | 285.4                  | 1,157.3                         | 17.2                           | 18.4   | 1,121.6  | 3,392.9             | 30,172.7                  | 16,900.3                  | 13,272.4                     | 56.0%        |
| 2034        | 290.4                  | 1,177.7                         | 17.6                           | 18.7   | 1,141.4  | 3,452.8             | 30,904.8                  | 17,534.6                  | 13,370.2                     | 56.7%        |
| 2035        | 295.3                  | 1,197.5                         | 17.8                           | 19.0   | 1,160.6  | 3,510.8             | 31,642.1                  | 18,190.5                  | 13,451.6                     | 57.5%        |
| 2036        | 300.0                  | 1,216.4                         | 18.1                           | 19.3   | 1,178.9  | 3,566.2             | 32,379.5                  | 18,864.6                  | 13,515.0                     | 58.3%        |
| 2037        | 304.4                  | 1,234.4                         | 18.4                           | 19.6   | 1,196.4  | 3,619.0             | 33,122.5                  | 19,564.0                  | 13,558.6                     | 59.1%        |

<sup>1</sup>The Board of Education contributions for a given year are equal to the sum of the Additional Board of Education Contributions and the Required Board of Education Contributions. Any contributions by the State of Illinois (other than the Additional State Contributions shown above) are to be credited against the Required Board of Education Contributions.

**SECTION 4: Valuation Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

**EXHIBIT III (continued)**

**Projection of Contributions, Liabilities, and Assets**

(Board of Education contributions are based on Public Act 96-0889)  
(All dollar amounts are in millions. Actuarial Liability and asset figures as of end of year.)

| Fiscal Year | Employee Contributions | Required Employer Contributions | Additional State Contributions | Additional Board of Education Contributions <sup>1</sup> | Required Board of Education Contributions <sup>1</sup> | Pensionable Payroll | Total Actuarial Liability | Actuarial Value of Assets | Unfunded Actuarial Liability | Funded Ratio |
|-------------|------------------------|---------------------------------|--------------------------------|--|--|---------------------|---------------------------|---------------------------|------------------------------|--------------|
| 2038        | 308.7                  | 1,251.7                         | 18.7                           | 19.9   | 1,213.2  | 3,669.9             | 33,855.6                  | 20,275.8                  | 13,579.8                     | 59.9%        |
| 2039        | 312.7                  | 1,268.1                         | 18.9                           | 20.2   | 1,229.1  | 3,718.0             | 34,571.9                  | 20,995.3                  | 13,576.7                     | 60.7%        |
| 2040        | 316.5                  | 1,283.6                         | 19.1                           | 20.4   | 1,244.0  | 3,763.2             | 35,265.7                  | 21,718.2                  | 13,547.4                     | 61.6%        |
| 2041        | 320.1                  | 1,298.2                         | 19.4                           | 20.6   | 1,258.2  | 3,806.2             | 35,930.7                  | 22,440.7                  | 13,490.0                     | 62.5%        |
| 2042        | 323.6                  | 1,312.3                         | 19.6                           | 20.9   | 1,271.9  | 3,847.4             | 36,559.0                  | 23,157.5                  | 13,401.5                     | 63.3%        |
| 2043        | 326.8                  | 1,325.3                         | 19.8                           | 21.1   | 1,284.5  | 3,885.7             | 37,144.7                  | 23,864.7                  | 13,280.0                     | 64.2%        |
| 2044        | 329.9                  | 1,337.9                         | 19.9                           | 21.3   | 1,296.7  | 3,922.4             | 37,686.9                  | 24,562.6                  | 13,124.3                     | 65.2%        |
| 2045        | 333.2                  | 1,351.3                         | 20.1                           | 21.5   | 1,309.6  | 3,961.6             | 38,181.7                  | 25,250.6                  | 12,931.1                     | 66.1%        |
| 2046        | 336.6                  | 1,365.0                         | 20.3                           | 21.7   | 1,323.0  | 4,002.1             | 38,632.4                  | 25,933.0                  | 12,699.3                     | 67.1%        |
| 2047        | 340.6                  | 1,381.1                         | 20.6                           | 21.9   | 1,338.5  | 4,049.0             | 39,042.9                  | 26,616.8                  | 12,426.1                     | 68.2%        |
| 2048        | 345.1                  | 1,399.4                         | 20.9                           | 22.2   | 1,356.3  | 4,102.9             | 39,417.0                  | 27,310.1                  | 12,106.9                     | 69.3%        |
| 2049        | 350.0                  | 1,419.4                         | 21.2                           | 22.6   | 1,375.7  | 4,161.5             | 39,759.9                  | 28,021.0                  | 11,738.9                     | 70.5%        |
| 2050        | 355.5                  | 1,441.7                         | 21.5                           | 22.9   | 1,397.3  | 4,226.7             | 40,076.2                  | 28,758.7                  | 11,317.5                     | 71.8%        |
| 2051        | 361.5                  | 1,465.9                         | 21.9                           | 23.3   | 1,420.8  | 4,297.8             | 40,367.0                  | 29,529.3                  | 10,837.7                     | 73.2%        |
| 2052        | 367.9                  | 1,491.7                         | 22.2                           | 23.7   | 1,445.8  | 4,373.4             | 40,637.0                  | 30,342.3                  | 10,294.7                     | 74.7%        |
| 2053        | 374.6                  | 1,519.1                         | 22.6                           | 24.1   | 1,472.4  | 4,453.9             | 40,879.7                  | 31,198.4                  | 9,681.3                      | 76.3%        |
| 2054        | 381.4                  | 1,546.7                         | 23.1                           | 24.6   | 1,499.1  | 4,534.7             | 41,095.4                  | 32,102.4                  | 8,993.0                      | 78.1%        |
| 2055        | 388.6                  | 1,575.8                         | 23.5                           | 25.0   | 1,527.3  | 4,620.0             | 41,286.3                  | 33,062.8                  | 8,223.5                      | 80.1%        |
| 2056        | 396.1                  | 1,606.4                         | 23.9                           | 25.5   | 1,556.9  | 4,709.6             | 41,452.9                  | 34,086.7                  | 7,366.2                      | 82.2%        |
| 2057        | 404.1                  | 1,638.7                         | 24.4                           | 26.0   | 1,588.2  | 4,804.4             | 41,603.5                  | 35,189.9                  | 6,413.6                      | 84.6%        |
| 2058        | 412.4                  | 1,672.5                         | 24.9                           | 26.6   | 1,621.0  | 4,903.5             | 41,740.2                  | 36,383.7                  | 5,356.5                      | 87.2%        |
| 2059        | 420.8                  | 1,706.5                         | 25.4                           | 27.1   | 1,653.9  | 5,003.1             | 41,870.4                  | 37,683.3                  | 4,187.0                      | 90.0%        |

<sup>1</sup>The Board of Education contributions for a given year are equal to the sum of the Additional Board of Education Contributions and the Required Board of Education Contributions. Any contributions by the State of Illinois (other than the Additional State Contributions shown above) are to be credited against the Required Board of Education Contributions.

**SECTION 4: Valuation Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

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**EXHIBIT IV**

**Actuarial Assumptions and Actuarial Cost Method**

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**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 Actuarial Experience Review dated September 13, 2013. Current data is reviewed in conjunction with each annual valuation. Since the prior valuation, the GASB 43 discount rate, health coverage election, valuation-year per capita health costs and trend rates were updated. Based on professional judgement, no additional assumption changes are warranted at this time.

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**Mortality Rates:**

*Healthy:*

The RP-2000 Combined Healthy Mortality Table, set back 2 years with generational improvement from 2004 using Scale AA (adopted June 30, 2013).

*Disabled:*

The RP-2000 Disabled Mortality Table, set back 3 years (adopted June 30, 2013).

The mortality tables specified above without future generational improvement reasonably reflect the projected mortality experience of the Fund as of the measurement date. The healthy mortality table was then adjusted to future years using additional generational improvement using Scale AA to anticipate future mortality improvement.

**SECTION 4: Valuation Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

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**Termination Rates:**

Select and ultimate termination rates were based on recent experience of the Fund (adopted June 30, 2013). Ultimate rates after the tenth year are shown for sample ages in the second table below. Select rates are as follows:

| <b>Years of Service</b> | <b>Rate (%)</b> |
|-------------------------|-----------------|
| Less than 1             | 25.0            |
| 1 - 1.99                | 15.0            |
| 2 - 2.99                | 10.0            |
| 3 - 3.99                | 9.0             |
| 4 - 4.99                | 8.0             |
| 5 - 5.99                | 7.0             |
| 6 - 6.99                | 6.0             |
| 7 - 7.99                | 5.0             |
| 8 - 8.99                | 4.5             |
| 9 - 9.99                | 4.0             |

| <b>Age</b> | <b>Rate (%)</b>             |
|------------|-----------------------------|
|            | <b>10+ Years of Service</b> |
| 30         | 2.5                         |
| 35         | 2.5                         |
| 40         | 2.3                         |
| 45         | 2.0                         |
| 50         | 2.0                         |
| 55         | 2.0                         |

**SECTION 4: Valuation Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

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**Retirement Rates:**

For employees first hired prior to January 1, 2011, rates of retirement for each age from 55 to 75 were based on the recent experience of the Fund (adopted June 30, 2013). Sample rates are shown below.

| <b>Age</b> | <b>Rate (%)</b>                |                             |
|------------|--------------------------------|-----------------------------|
|            | <b>&lt;34 Years of Service</b> | <b>34+ Years of Service</b> |
| 55         | 5.0                            | 20.0                        |
| 60         | 9.0                            | 22.5                        |
| 65         | 15.0                           | 25.0                        |
| 70         | 20.0                           | 30.0                        |
| 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). Sample rates are shown below.

| <b>Age</b> | <b>Rate (%)</b> |
|------------|-----------------|
| 62         | 40.0            |
| 64         | 25.0            |
| 67         | 30.0            |
| 70         | 20.0            |
| 75         | 100.0           |

**Disability Rates:**

Disability rates, based on the recent experience of the Fund, were applied to members with at least ten years of service (adopted June 30, 2013). All disabilities are assumed to be non-duty disabilities. Sample rates are shown below.

| <b>Age</b> | <b>Rate (%)</b> |
|------------|-----------------|
| 30         | 0.06            |
| 40         | 0.08            |
| 50         | 0.16            |
| 60         | 0.20            |

**SECTION 4: Valuation Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

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**Salary Increases:**

Assumed salary increases were based on the recent experience of the Fund (adopted June 30, 2013). Sample rates are shown below.

| <b>Age</b> | <b>Rate (%)</b> |
|------------|-----------------|
| 25         | 10.8            |
| 30         | 7.3             |
| 35         | 7.3             |
| 40         | 5.8             |
| 45         | 5.3             |
| 50         | 4.8             |
| 55         | 4.3             |

**Valuation of Inactive Vested Participants:**

The account balance is projected to retirement (age 62) with interest, converted to an annuity, and loaded by 35%.

**Unknown Data for Participants:**

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

**Spouses:**

Demographic data was available for spouses of current retirees. For future retirees, 80% of participants are assumed to be married, with husbands two years older than their wives. Upon the death of the retiree, 20% of surviving spouses are assumed to elect health coverage (adopted June 30, 2013).

## SECTION 4: Valuation Information for the Public School Teachers' Pension and Retirement Fund of Chicago

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### **Health Coverage Election:**

55% of future female retirees under age 65 and 35% of future male retirees under age 65 were assumed to elect health and welfare coverage. 80% of future female retirees age 65 and greater and 65% of future male retirees age 65 and greater were assumed to elect health and welfare coverage. This assumption was also applied to retirees currently receiving COBRA reimbursement. Of current retirees under age 65 who are not currently participating, 55.6% of females and 46.2% of males were assumed to elect health and welfare coverage at age 65 (modified June 30, 2016).

Of current and future terminated participants with 10 or more years of service, 15% were assumed to meet eligibility requirements and elect health coverage (adopted June 30, 2013). Terminated participants with less than 10 years of service were assumed not to participate. Terminated employees first hired prior to January 1, 2011 were assumed to retire at age 60 with 20 or more years of service, or at age 62. Terminated employees first hired on or after January 1, 2011 were assumed to retire at age 65 (adopted June 30, 2012).

### **Per Capita Cost Development:**

Per capita claims costs were based on the average retiree premiums and Part A and B reimbursements as of January 1, 2016, and average rebates paid in year ended June 30, 2016 (assumed to have been incurred relatively evenly between calendar year 2014 and calendar year 2015). Averages were calculated separately for retirees under and over age 65. The averages were trended to the midpoint of the valuation year at assumed trend rates. Actuarial factors were then applied to the average cost to estimate individual retiree and spouse costs by age and by gender.

**SECTION 4: Valuation Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

**Per Capita Health Costs:**

Average claims for the plan year beginning July 1, 2016 are shown in the table below for retirees at selected ages. Costs shown are total costs; plan pays 50%.

| Age | Retiree  |          | Spouse  |          |
|-----|----------|----------|---------|----------|
|     | Male     | Female   | Male    | Female   |
| 55  | \$12,289 | \$12,688 | \$9,672 | \$10,954 |
| 60  | 14,594   | 13,676   | 12,948  | 12,705   |
| 64  | 16,744   | 14,508   | 16,345  | 14,300   |

| Age | Participant with a pension effective date prior to July 1, 2016 |        | Participant with a pension effective date on or after July 1, 2016 |        |
|-----|---|--------|--|--------|
|     | Male  | Female | Male   | Female |
| 65  | 5,766   | 4,901  | 5,225  | 4,441  |
| 70  | 6,683   | 5,282  | 6,056  | 4,786  |
| 75  | 7,202   | 5,685  | 6,526  | 5,152  |

**Health Care Cost Trend Rates:**

Health care trend measures the anticipated overall rate at which health plan costs are expected to increase in future years.

| Year Ending June 30 | Rate (%) |
|---------------------|----------|
| 2017                | 7.75     |
| 2018                | 7.30     |
| 2019                | 6.85     |
| 2020                | 6.40     |
| 2021                | 5.95     |
| 2022                | 5.50     |
| 2023                | 5.05     |
| 2024                | 4.60     |
| 2025 & Later        | 4.50     |

The trend rate assumptions were developed using Segal's internal guidelines, which are established each year using data sources such as the 2016 Segal Health Trend Survey, internal client results, trends from other published surveys prepared by the S&P Dow Jones Indices, consulting firms and brokers, and CPI statistics published by the Bureau of Labor Statistics.



#### SECTION 4: Valuation Information for the Public School Teachers' Pension and Retirement Fund of Chicago

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|                                     |   |
|-------------------------------------|---|
| <b>Net Investment Return:</b>       | 7.75% per year (adopted June 30, 2013). The net investment return assumption is a long-term estimate derived from historical data, current and recent market expectations, and professional judgement. As part of the analysis, a building block approach was used that reflects inflation expectations and anticipated risk premiums for each of the portfolio's asset classes, as well as the Fund's target asset allocation.   |
| <b>GASB 43 Discount Rate:</b>       | 3.50% per year, based on the expected rate of return on day-to-day employer funds.  |
| <b>GASB 67 Discount Rate:</b>       | 7.75% per year  |
| <b>Inflation:</b>                   | 2.75% per year (adopted June 30, 2013)  |
| <b>Payroll Growth:</b>              | 3.50% per year (adopted June 30, 2013)  |
| <b>Administrative Expenses:</b>     | Equal to actual expenses for the prior year, increased by 5%. Future expenses are assumed to grow at 5% per year.   |
| <b>Total Service at Retirement:</b> | Total service at retirement is assumed to be 103.3% of the teacher's regular period of service at retirement.   |
| <b>Actuarial Value of Assets:</b>   | <p>For funding purposes, the actuarial value of assets was determined by smoothing unexpected gains and losses over a period of 4 years. The gain or loss for a year is calculated as the total investment income on the market 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) 25% of the calculated gain (or loss) in the prior 4 years.</p> <p>For GASB purposes, the actuarial value of assets is equal to the market value of assets.</p> |

## SECTION 4: Valuation Information for the Public School Teachers' Pension and Retirement Fund of Chicago

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### **Actuarial Cost Method:**

Projected Unit Credit (adopted August 31, 1991) is used for funding and GASB 43 purposes. Under this method, the projected benefits of each individual included in the valuation are allocated by a consistent formula to valuation years. The actuarial present value of benefits allocated to a valuation year is called the normal cost. The actuarial present value of benefits allocated to all periods prior to a valuation year is called the accrued liability.

Entry Age Normal is used for GASB 67 purposes. 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.

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### **OPEB Plan Design:**

Development of plan liabilities was based on the substantive plan of benefits in effect as described in Exhibit V and on the established pattern or practice with regard to sharing of benefit costs between the employer and plan members. In particular, this valuation under GASB 43 does not take into account the current \$65 million maximum of annual payments that may be paid from the Fund, as there has been a history of increases in the annual dollar maximum.

The valuation includes recognition of the excise tax. The applicable annual limitation used to determine the estimated amount of excise tax is assumed to increase 2.75% per year beginning in 2019.

The effect on the obligation of other future aspects of the Patient Protection and Affordable Care Act (PPACA) and the Health Care and Education Reconciliation Act (HCERA) of 2010 are assumed to be *de minimis*.

## SECTION 4: Valuation Information for the Public School Teachers' Pension and Retirement Fund of Chicago

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### EXHIBIT V

#### Summary of Plan Provisions

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

|                                    |   |
|------------------------------------|---|
| <b>Membership:</b>                 | Any teacher and certain other employees of the Chicago Public Schools, approved charter schools, and the Chicago Teachers' Pension Fund are participants of this pension fund. Members hired before 2011 are Tier 1 members. Members hired in or after 2011 are Tier 2 members.   |
| <b>Employee Contributions:</b>     | All participants of the Fund are required to contribute 9% of salary to the Fund as follows: 7.5% for the retirement pension, 1% for the spouse's pension, and 0.5% for the automatic increases in the retirement pension. As of September 1981, the Board of Education has been paying 7% of the required teacher contributions for Chicago public school teachers. Charter school contributions may be contributed at various rates by the employers and teachers.  |
| <b>Service Retirement Pension:</b> | <p>a. Eligibility – An employee may retire at age 55 with at least 20 years of service or at age 62 with 5 years of service. If retirement occurs before age 60, the service retirement pension is reduced <math>\frac{1}{2}</math> 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 34 years of service.</p> <p>b. Amount – For service earned before July 1, 1998, the amount of the service retirement pension is 1.67% of highest average salary for the first 10 years, 1.90% for each of the next 10 years, 2.10% for each of the following 10 years, and 2.30% for each year above 30. For service earned after June 30, 1998, the amount of the service retirement pension is 2.2% of highest average salary for each year of service.</p> <p>Service earned before July 1, 1998 can be upgraded to the 2.2% formula through the payment of additional employee contributions of 1% of the teacher's highest salary within the last four years for each year of prior service, up to a maximum of 20%, which upgrades all service years. The number of years for which contributions are</p> |

## SECTION 4: Valuation Information for the Public School Teachers' Pension and Retirement Fund of Chicago

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required is reduced by one for each three full years of service after June 30, 1998. No contribution is required if the employee has at least 30 years of service.

The highest average salary is the average of the 4 highest consecutive years of salary within the last 10 years.

The maximum pension payable is 75% of the highest annual salary or \$1,500 per month, whichever is greater.

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 2016, the salary is limited to \$111,572, as determined by the Illinois Department of Insurance. The limit 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.

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### **Post-Retirement Increase:**

An annuitant is entitled to automatic annual increases of 3% of the current pension starting the later of attainment of age 61 and receipt of one year's pension payments.

Automatic annual increases in the retirement annuity for employees who first become a participant on or after January 1, 2011 is 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. This automatic annual increase starts the later of attainment of age 67 and receipt of one year's pension payments.

## SECTION 4: Valuation Information for the Public School Teachers' Pension and Retirement Fund of Chicago

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### **Survivor's Pension:**

A surviving spouse or unmarried minor child is entitled to a pension upon the death of an employee while in service or on retirement. The minimum survivor's pension is 50% of the deceased employee's or retired employee's pension at the date of death. If the spouse is under age 50 and no unmarried minor children under age 18 survive, payment of the survivor's pension is deferred until age 50.

Survivor's pensions are subject to annual increases of 3% per year based on the current amount of pension starting the later of when the member would have attained age 61 and receipt of one year's pension payments.

For employees who first become a participant on or after January 1, 2011, the initial survivor's pension is equal to  $66\frac{2}{3}\%$  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. This automatic annual increase starts the later of when the member would have attained age 67 and receipt of one year's pension payments.

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### **Single Sum Death Benefit:**

Upon the death of an employee in service, a refund equal to the total contributions less contributions for survivor's pensions is payable.

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 the lesser of \$10,000 and salary earned for the most recent six months.

Upon the death of a retired member, the death benefit is the lesser of \$10,000 and the most recent salary earned for a 6 month period less 20% of the death benefit for each year that the member has been on pension, to a minimum of \$5,000.

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### **Non-Duty Disability Benefit:**

A non-duty disability pension is payable in the event of total or permanent disability with 10 or more years of service. The benefit is the unreduced service retirement pension. However, if the participant has 20 or more and less than 25 years of service and is under age 55, the benefit is reduced by  $\frac{1}{2}$  of 1% for each month that the age of the member is below 55 down to a minimum age of 50, but not less than the unreduced service retirement pension with 20 years of service.

**SECTION 4: Valuation Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

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|                                    |  |
|------------------------------------|--|
| <b>Duty Disability Benefit:</b>    | Upon disability resulting from an injury incurred while working, an employee is entitled to a disability benefit of 75% of final average salary until age 65. At age 65, the disabled employee shall receive a service retirement pension, which includes service earned while disabled.   |
| <b>Refunds:</b>                    | <p>An employee who terminates employment before qualifying for a pension is entitled to a refund of employee contributions, without interest.</p> <p>An employee who is unmarried at date of retirement is entitled to a refund of the full amount contributed for the survivor's pension, without interest.</p>   |
| <b>Retiree Health Insurance:</b>   | <p>Partial reimbursement of the cost of health insurance coverage, which may be in the form of an annual direct payment or a reduction in the amount deducted from the monthly annuity. Effective January 1, 2015, the Board provides reimbursement of 50% of the cost of pensioners' health insurance coverage. Beginning in 2015, the maximum reimbursement for non-Chicago Teachers' Pension Fund plans will be limited to an amount based on the most economical Chicago Teachers' Pension Fund plan option.</p> <p>The total amount of payments in any year may not exceed 75% of the total cost of health insurance coverage in that year for all recipients who receive payments in that year. Total payments may not exceed \$65,000,000 plus any amount that was authorized to be paid in the preceding year but was not actually paid (including any interest earned).</p> |
| <b>Plan Year:</b>                  | July 1 through June 30   |
| <b>Changes in Plan Provisions:</b> | There are no changes in plan provisions for this valuation   |

## SECTION 5: GASB Information for Public School Teachers' Pension and Retirement Fund of Chicago

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### EXHIBIT 1

#### GASB 67 Net Pension Liability

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The components of the net pension liability at June 30, 2016, were as follows:

|  |                  |
|--|------------------|
| Total pension liability  | \$21,124,697,012 |
| Plan fiduciary net position  | 10,093,067,588   |
| Net pension liability  | 11,031,629,424   |
| Plan fiduciary net position as a percentage of the total pension liability | 47.78%           |

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*Actuarial assumptions.* The total pension liability was determined by an actuarial valuation as of June 30, 2016, using the following actuarial assumptions, applied to all periods included in the measurement:

|                            |   |
|----------------------------|---|
| Inflation                  | 2.75%   |
| Salary increases           | 4.25% to 15.75%, varying by age   |
| Investment rate of return  | 7.75%, net of investment expense  |
| Cost of living adjustments | 3% compound for Tier 1 participants; the lesser of 3% or one-half of CPI, simple, for Tier 2 participants |

For healthy participants, mortality rates were based on the RP-2000 Healthy Mortality Table for Males or Females, as appropriate, set back 2 years and adjusted for mortality improvements generationally from 2004 based on Scale AA. For disabled participants, mortality rates were based on the RP-2000 Disabled Mortality Table, set back 3 years.

The actuarial assumptions used in the June 30, 2016, valuation were based on the results of an experience study for the period July 1, 2007, through June 30, 2012.

*Discount rate:* The discount rate used to measure the total pension liability was 7.75%. The projection of cash flows used to determine the discount rate assumed plan member contributions will be made at the current contribution rate and that employer contributions will be made as specified by Public Act 96-0889. Based on those assumptions, the pension fund's fiduciary net position was projected to be available to make all projected future benefit payments of current fund participants. Therefore, the long-term expected rate of return on pension fund investments was applied to all periods of projected benefit payments to determine the total pension liability.

## SECTION 5: GASB Information for Public School Teachers' Pension and Retirement Fund of Chicago

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*Sensitivity of the net pension liability to changes in the discount rate.* The following presents the net pension liability as of June 30, 2016, calculated using the discount rate of 7.75%, as well as what the net pension liability would be if it were calculated using a discount rate that is 1-percentage-point lower (6.75%) or 1-percentage-point higher (8.75%) than the current rate:

|   | <b>1% Decrease<br/>(6.75%)</b> | <b>Current<br/>Discount<br/>(7.75%)</b> | <b>1% Increase<br/>(8.75%)</b> |
|---|--------------------------------|---|--------------------------------|
| Net pension liability as of June 30, 2016 | \$13,724,105,489               | \$11,031,629,424                        | \$8,805,031,271                |



**SECTION 5: GASB Information for Public School Teachers' Pension and Retirement Fund of Chicago**

**EXHIBIT 2  
GASB 67 Schedule of Changes in Net Pension Liability**

|   | <b>2016</b>             | <b>2015</b>             | <b>2014</b>             |
|---|-------------------------|-------------------------|-------------------------|
| <b>Total pension liability</b>  |                         |                         |                         |
| Service cost  | \$325,992,943           | \$318,734,274           | \$332,188,481           |
| Interest  | 1,576,876,771           | 1,547,663,416           | 1,509,307,860           |
| Change of benefit terms   | 0                       | 0                       | 0                       |
| Differences between expected and actual experience                                | (106,563,600)           | (138,512,940)           | (14,177,102)            |
| Changes of assumptions  | 0                       | 0                       | 0                       |
| Benefit payments, including refunds of employee contributions                     | <u>(1,384,826,398)</u>  | <u>(1,331,567,406)</u>  | <u>(1,306,341,856)</u>  |
| <b>Net change in total pension liability</b>                                      | \$411,479,716           | \$396,317,344           | \$520,977,383           |
| <b>Total pension liability – beginning</b>  | <u>20,713,217,296</u>   | <u>20,316,899,952</u>   | <u>19,795,922,569</u>   |
| <b>Total pension liability – ending (a)</b>                                       | <u>\$21,124,697,012</u> | <u>\$20,713,217,296</u> | <u>\$20,316,899,952</u> |
| <b>Plan fiduciary net position</b>  |                         |                         |                         |
| Contributions – employer  | \$635,070,000           | \$643,667,000           | \$585,416,141           |
| Contributions – employee  | 191,882,430             | 191,233,298             | 187,846,065             |
| Net investment income   | (28,176,952)            | 381,688,430             | 1,685,079,840           |
| Benefit payments, including refunds of employee contributions                     | (1,384,826,398)         | (1,331,567,406)         | (1,306,341,856)         |
| Administrative expense  | (12,298,862)            | (11,705,562)            | (10,494,139)            |
| Other   | <u>1,463,050</u>        | <u>943,946</u>          | <u>0</u>                |
| <b>Net change in plan fiduciary net position</b>                                  | (\$596,886,732)         | (\$125,740,294)         | \$1,141,506,051         |
| <b>Plan fiduciary net position – beginning</b>                                    | <u>10,689,954,320</u>   | <u>10,815,694,614</u>   | <u>9,674,188,563</u>    |
| <b>Plan fiduciary net position – ending (b)</b>                                   | \$10,093,067,588        | \$10,689,954,320        | \$10,815,694,614        |
| <b>Fund's net pension liability – ending (a) – (b)</b>                            | <u>\$11,031,629,424</u> | <u>\$10,023,262,976</u> | <u>\$9,501,205,338</u>  |
| <b>Plan fiduciary net position as a percentage of the total pension liability</b> | 47.78%                  | 51.61%                  | 53.23%                  |
| <b>Covered employee payroll</b>   | \$2,281,268,890         | \$2,273,551,432         | \$2,233,280,995         |
| <b>Fund's net pension liability as percentage of covered employee payroll</b>     | 483.57%                 | 440.86%                 | 425.44%                 |

**SECTION 5: GASB Information for Public School Teachers' Pension and Retirement Fund of Chicago**

**EXHIBIT 3**

**GASB 67 Schedule of Employer Contribution – Last Ten Fiscal Years**

| <b>Year Ended<br/>June 30</b> | <b>Actuarially<br/>Determined<br/>Contributions</b> | <b>Contributions in<br/>Relation to the<br/>Actuarially<br/>Determined<br/>Contributions</b> | <b>Contribution<br/>Deficiency (Excess)</b> | <b>Covered Actual<br/>Employee Payroll</b> | <b>Contributions as<br/>a Percentage of<br/>Covered Employee<br/>Payroll</b> |
|-------------------------------|---|--|---|--|--|
| 2007                          | \$311,139,800                                       | \$103,761,750  | \$207,378,050                               | \$1,863,182,086                            | 5.57%  |
| 2008                          | 290,072,885   | 164,270,412  | 125,802,473                                 | 1,914,558,916                              | 8.58%  |
| 2009                          | 292,145,359   | 198,069,327  | 94,076,032                                  | 1,996,194,224                              | 9.92%  |
| 2010                          | 355,846,125   | 290,759,950  | 65,086,175                                  | 2,107,934,080                              | 13.79%   |
| 2011                          | 430,091,545   | 143,589,994  | 286,501,551                                 | 2,090,131,858                              | 6.87%  |
| 2012                          | 510,101,466   | 138,729,011  | 371,372,455                                 | 2,224,903,121                              | 6.24%  |
| 2013                          | 585,444,539   | 142,654,000  | 442,790,539                                 | 2,239,347,051                              | 6.37%  |
| 2014                          | 719,781,746   | 585,416,141  | 134,365,605                                 | 2,233,280,995                              | 26.21%   |
| 2015                          | 728,488,520   | 643,667,000  | 84,821,520                                  | 2,273,551,432                              | 28.31%   |
| 2016                          | 749,796,517   | 635,070,000  | 114,726,517                                 | 2,281,268,890                              | 27.84%   |

**SECTION 5: GASB Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

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**Notes to EXHIBIT 3**

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|   |   |
|---|---|
| <b>Valuation date</b>   | Actuarially determined contribution amount is determined as of June 30, with appropriate interest to the end of the year.   |
| <b>Methods and assumptions used to establish "actuarially determined contribution" rates:</b> |   |
| <b>Actuarial cost method</b>  | Projected Unit Credit cost method   |
| <b>Amortization method</b>  | 30-year closed effective July 1, 2013 (27 years remaining), level percentage of salary amortization   |
| <b>Asset valuation method</b>   | 4-year smoothed market  |
| <b>Actuarial assumptions:</b>   |   |
| Investment rate of return   | 7.75%, net of investment expense  |
| Projected salary increases  | 4.25% to 15.75%, varying by age   |
| Mortality   | For healthy participants, mortality rates were based on the RP-2000 Healthy Mortality Table for Males or Females, as appropriate, set back 2 years and adjusted for mortality improvements generationally from 2004 based on Scale AA. For disabled participants, mortality rates were based on the RP-2000 Disabled Mortality Table, set back 3 years. |
| Cost of living adjustments  | 3% compound for Tier 1 participants; the lesser of 3% or one-half of CPI, simple, for Tier 2 participants   |

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**SECTION 5: GASB Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

**EXHIBIT 4**

**Development of Blended Discount Rate**

| Year | Projected                        | Projected Total Contributions <sup>1</sup> | Projected Benefit Payments | Projected Administrative Expense | Projected Investment Earnings | Benefit Payments: |          | PV of Benefit Payments: |               |
|------|----------------------------------|--|----------------------------|----------------------------------|-------------------------------|-------------------|----------|-------------------------|---------------|
|      | Beginning Fiduciary Net Position |  |                            |                                  |                               | Funded            | Unfunded | LT/ST Rate <sup>2</sup> | Single Equiv  |
| 0    | 10,093,067,588                   | 867,721,272                                | 1,398,429,722              | 12,913,805                       | 734,782,418                   | 1,398,429,722     | -        | 1,347,199,790           | 1,347,199,790 |
| 1    | 10,284,227,750                   | 908,712,031                                | 1,426,173,985              | 13,085,783                       | 748,592,104                   | 1,426,173,985     | -        | 1,275,106,889           | 1,275,106,889 |
| 2    | 10,502,272,117                   | 936,682,257                                | 1,454,145,240              | 13,374,454                       | 764,495,277                   | 1,454,145,240     | -        | 1,206,603,523           | 1,206,603,523 |
| 3    | 10,735,929,957                   | 964,980,834                                | 1,481,709,965              | 13,718,913                       | 781,623,395                   | 1,481,709,965     | -        | 1,141,044,878           | 1,141,044,878 |
| 4    | 10,987,105,308                   | 993,884,599                                | 1,509,380,012              | 14,103,582                       | 800,103,780                   | 1,509,380,012     | -        | 1,078,750,078           | 1,078,750,078 |
| 5    | 11,257,610,092                   | 1,023,218,545                              | 1,536,767,429              | 14,521,254                       | 820,089,473                   | 1,536,767,429     | -        | 1,019,326,028           | 1,019,326,028 |
| 6    | 11,549,629,426                   | 1,052,962,778                              | 1,564,301,477              | 14,970,844                       | 841,732,511                   | 1,564,301,477     | -        | 962,959,769             | 962,959,769   |
| 7    | 11,865,052,394                   | 1,082,902,958                              | 1,592,296,562              | 15,453,797                       | 865,166,483                   | 1,592,296,562     | -        | 909,691,981             | 909,691,981   |
| 8    | 12,205,371,476                   | 1,112,502,909                              | 1,621,535,293              | 15,961,363                       | 890,469,935                   | 1,621,535,293     | -        | 859,764,553             | 859,764,553   |
| 9    | 12,570,847,663                   | 1,141,104,265                              | 1,651,623,292              | 16,494,031                       | 917,671,633                   | 1,651,623,292     | -        | 812,731,047             | 812,731,047   |
| 10   | 12,961,506,238                   | 1,168,243,679                              | 1,684,652,475              | 17,048,649                       | 946,688,047                   | 1,684,652,475     | -        | 769,358,749             | 769,358,749   |
| 11   | 13,374,736,840                   | 1,192,899,769                              | 1,719,180,699              | 17,617,679                       | 977,360,819                   | 1,719,180,699     | -        | 728,656,462             | 728,656,462   |
| 12   | 13,808,199,049                   | 1,215,537,017                              | 1,755,830,887              | 18,197,359                       | 1,009,486,336                 | 1,755,830,887     | -        | 690,663,809             | 690,663,809   |
| 13   | 14,259,194,156                   | 1,236,298,857                              | 1,794,593,203              | 18,784,576                       | 1,042,857,698                 | 1,794,593,203     | -        | 655,137,946             | 655,137,946   |
| 14   | 14,724,972,932                   | 1,255,602,892                              | 1,835,899,275              | 19,379,519                       | 1,077,248,568                 | 1,835,899,275     | -        | 622,011,347             | 622,011,347   |
| 15   | 15,202,545,598                   | 1,273,827,171                              | 1,878,256,103              | 19,986,007                       | 1,112,487,154                 | 1,878,256,103     | -        | 590,591,221             | 590,591,221   |
| 16   | 15,690,617,812                   | 1,291,545,069                              | 1,922,937,116              | 20,602,281                       | 1,148,432,693                 | 1,922,937,116     | -        | 561,151,311             | 561,151,311   |
| 17   | 16,187,056,177                   | 1,308,106,891                              | 1,969,634,846              | 21,223,832                       | 1,184,923,061                 | 1,969,634,846     | -        | 533,437,251             | 533,437,251   |
| 18   | 16,689,227,451                   | 1,323,360,976                              | 2,018,597,096              | 21,853,042                       | 1,221,744,174                 | 2,018,597,096     | -        | 507,376,077             | 507,376,077   |
| 19   | 17,193,882,462                   | 1,336,979,326                              | 2,070,863,480              | 22,488,781                       | 1,258,600,393                 | 2,070,863,480     | -        | 483,074,967             | 483,074,967   |
| 20   | 17,696,109,920                   | 1,348,917,726                              | 2,116,710,972              | 23,128,006                       | 1,295,486,838                 | 2,116,710,972     | -        | 458,255,140             | 458,255,140   |
| 21   | 18,200,675,507                   | 1,359,737,400                              | 2,175,372,003              | 23,773,305                       | 1,332,039,036                 | 2,175,372,003     | -        | 437,081,113             | 437,081,113   |
| 22   | 18,693,306,634                   | 1,368,928,714                              | 2,237,599,210              | 24,415,954                       | 1,367,502,455                 | 2,237,599,210     | -        | 417,247,292             | 417,247,292   |
| 23   | 19,167,722,639                   | 1,376,351,316                              | 2,302,625,376              | 25,062,888                       | 1,401,414,711                 | 2,302,625,376     | -        | 398,489,823             | 398,489,823   |
| 24   | 19,617,800,403                   | 1,382,379,582                              | 2,370,331,271              | 25,716,864                       | 1,433,312,363                 | 2,370,331,271     | -        | 380,702,488             | 380,702,488   |
| 25   | 20,037,444,213                   | 1,387,186,178                              | 2,441,156,026              | 26,381,351                       | 1,462,706,201                 | 2,441,156,026     | -        | 363,877,271             | 363,877,271   |
| 26   | 20,419,799,214                   | 1,390,876,471                              | 2,512,381,400              | 27,046,521                       | 1,489,189,985                 | 2,512,381,400     | -        | 347,558,313             | 347,558,313   |
| 27   | 20,760,437,749                   | 1,393,571,468                              | 2,581,288,629              | 27,703,148                       | 1,512,513,154                 | 2,581,288,629     | -        | 331,406,789             | 331,406,789   |
| 28   | 21,057,530,594                   | 1,397,159,814                              | 2,649,630,922              | 28,369,118                       | 1,532,483,807                 | 2,649,630,922     | -        | 315,713,343             | 315,713,343   |
| 29   | 21,309,174,175                   | 1,401,383,537                              | 2,710,823,620              | 29,040,831                       | 1,549,218,345                 | 2,710,823,620     | -        | 299,772,325             | 299,772,325   |
| 30   | 21,519,911,606                   | 1,408,237,114                              | 2,765,812,904              | 29,708,914                       | 1,563,038,828                 | 2,765,812,904     | -        | 283,854,507             | 283,854,507   |
| 31   | 21,695,665,730                   | 1,418,985,398                              | 2,812,222,384              | 30,391,966                       | 1,574,539,265                 | 2,812,222,384     | -        | 267,858,466             | 267,858,466   |
| 32   | 21,846,576,043                   | 1,431,938,416                              | 2,851,595,217              | 31,053,396                       | 1,584,410,777                 | 2,851,595,217     | -        | 252,072,992             | 252,072,992   |
| 33   | 21,980,276,623                   | 1,448,143,153                              | 2,884,165,917              | 31,712,245                       | 1,593,251,086                 | 2,884,165,917     | -        | 236,614,525             | 236,614,525   |
| 34   | 22,105,792,700                   | 1,467,404,709                              | 2,913,180,262              | 32,362,004                       | 1,601,635,585                 | 2,913,180,262     | -        | 221,804,953             | 221,804,953   |
| 35   | 22,229,290,728                   | 1,488,601,374                              | 2,937,563,115              | 32,996,484                       | 1,610,059,365                 | 2,937,563,115     | -        | 207,574,408             | 207,574,408   |

<sup>1</sup> Projected as required by paragraph 41 of Statement 67

<sup>2</sup> Funded benefit payments discounted at the long-term expected rate of return, unfunded benefit payments discounted at the municipal bond index

**SECTION 5: GASB Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

**EXHIBIT 4**

**Development of Blended Discount Rate (Continued)**

| Year | Projected<br>Beginning<br>Fiduciary Net<br>Position | Projected<br>Total<br>Contributions <sup>1</sup> | Projected<br>Benefit<br>Payments | Projected<br>Administrative<br>Expense | Projected<br>Investment<br>Earnings | Benefit Payments: |          | PV of Benefit Payments: |              |
|------|---|--|----------------------------------|--|-------------------------------------|-------------------|----------|-------------------------|--------------|
|      |   |  |                                  |  |                                     | Funded            | Unfunded | LT/ST Rate <sup>2</sup> | Single Equiv |
| 36   | 22,357,391,868                                      | 1,513,441,166                                    | 2,958,725,522                    | 33,618,856                             | 1,619,042,271                       | 2,958,725,522     | -        | 194,032,286             | 194,032,286  |
| 37   | 22,497,530,927                                      | 1,538,622,688                                    | 2,975,748,323                    | 34,208,479                             | 1,629,128,470                       | 2,975,748,323     | -        | 181,112,424             | 181,112,424  |
| 38   | 22,655,325,283                                      | 1,565,661,991                                    | 2,986,583,035                    | 34,784,853                             | 1,640,835,778                       | 2,986,583,035     | -        | 168,697,777             | 168,697,777  |
| 39   | 22,840,455,164                                      | 1,594,339,069                                    | 2,987,569,687                    | 35,348,962                             | 1,655,050,009                       | 2,987,569,687     | -        | 156,615,785             | 156,615,785  |
| 40   | 23,066,925,592                                      | 1,624,947,069                                    | 2,977,611,990                    | 35,900,328                             | 1,672,898,947                       | 2,977,611,990     | -        | 144,866,615             | 144,866,615  |
| 41   | 23,351,259,290                                      | 1,658,440,357                                    | 2,957,976,770                    | 36,431,605                             | 1,695,663,091                       | 2,957,976,770     | -        | 133,560,393             | 133,560,393  |
| 42   | 23,710,954,363                                      | 1,692,335,592                                    | 2,927,607,372                    | 36,913,082                             | 1,724,695,331                       | 2,927,607,372     | -        | 122,681,332             | 122,681,332  |
| 43   | 24,163,464,832                                      | 423,396,903                                      | 2,887,643,715                    | 37,341,578                             | 1,761,304,205                       | 2,887,643,715     | -        | 112,303,161             | 112,303,161  |
| 44   | 23,423,180,647                                      | 429,077,284                                      | 2,840,271,744                    | 37,709,700                             | 1,705,773,291                       | 2,840,271,744     | -        | 102,515,843             | 102,515,843  |
| 45   | 22,680,049,778                                      | 434,623,577                                      | 2,785,021,405                    | 38,003,865                             | 1,650,334,891                       | 2,785,021,405     | -        | 93,291,559              | 93,291,559   |
| 46   | 21,941,982,976                                      | 440,041,695                                      | 2,722,065,219                    | 38,215,585                             | 1,595,597,164                       | 2,722,065,219     | -        | 84,624,295              | 84,624,295   |
| 47   | 21,217,341,031                                      | 445,223,973                                      | 2,651,264,085                    | 38,334,985                             | 1,542,210,228                       | 2,651,264,085     | -        | 76,494,858              | 76,494,858   |
| 48   | 20,515,176,162                                      | 450,142,804                                      | 2,572,437,298                    | 38,346,318                             | 1,490,883,559                       | 2,572,437,298     | -        | 68,882,163              | 68,882,163   |
| 49   | 19,845,418,909                                      | 454,641,340                                      | 2,485,689,297                    | 38,243,268                             | 1,442,377,817                       | 2,485,689,297     | -        | 61,771,983              | 61,771,983   |
| 50   | 19,218,505,502                                      | 459,222,594                                      | 2,391,197,734                    | 38,021,018                             | 1,397,499,271                       | 2,391,197,734     | -        | 55,149,669              | 55,149,669   |
| 51   | 18,646,008,614                                      | 463,882,534                                      | 2,289,180,624                    | 37,680,063                             | 1,357,136,173                       | 2,289,180,624     | -        | 48,999,337              | 48,999,337   |
| 52   | 18,140,166,634                                      | 468,612,871                                      | 2,179,983,831                    | 37,220,707                             | 1,322,223,252                       | 2,179,983,831     | -        | 43,305,807              | 43,305,807   |
| 53   | 17,713,798,219                                      | 473,411,112                                      | 2,064,178,829                    | 36,644,491                             | 1,293,731,646                       | 2,064,178,829     | -        | 38,055,979              | 38,055,979   |
| 54   | 17,380,117,657                                      | 478,265,887                                      | 1,942,922,789                    | 35,954,217                             | 1,272,640,064                       | 1,942,922,789     | -        | 33,244,044              | 33,244,044   |
| 55   | 17,152,146,602                                      | 483,162,540                                      | 1,816,818,712                    | 35,153,938                             | 1,259,933,584                       | 1,816,818,712     | -        | 28,850,452              | 28,850,452   |
| 56   | 17,043,270,077                                      | 488,101,070                                      | 1,686,926,593                    | 34,248,940                             | 1,256,608,256                       | 1,686,926,593     | -        | 24,861,077              | 24,861,077   |
| 57   | 17,066,803,870                                      | 493,081,620                                      | 1,554,490,147                    | 33,245,683                             | 1,263,647,607                       | 1,554,490,147     | -        | 21,261,526              | 21,261,526   |
| 58   | 17,235,797,267                                      | 498,104,327                                      | 1,420,836,983                    | 32,151,727                             | 1,282,011,214                       | 1,420,836,983     | -        | 18,035,718              | 18,035,718   |
| 59   | 17,562,924,097                                      | 503,169,556                                      | 1,287,437,296                    | 30,975,639                             | 1,312,624,003                       | 1,287,437,296     | -        | 15,166,941              | 15,166,941   |
| 60   | 18,060,304,722                                      | 508,277,427                                      | 1,155,873,876                    | 29,726,865                             | 1,356,363,597                       | 1,155,873,876     | -        | 12,637,614              | 12,637,614   |
| 61   | 18,739,345,004                                      | 513,428,146                                      | 1,027,720,831                    | 28,415,598                             | 1,414,052,559                       | 1,027,720,831     | -        | 10,428,276              | 10,428,276   |
| 62   | 19,610,689,280                                      | 518,621,921                                      | 904,439,573                      | 27,052,618                             | 1,486,458,776                       | 904,439,573       | -        | 8,517,255               | 8,517,255    |
| 63   | 20,684,277,786                                      | 523,858,958                                      | 787,468,499                      | 25,649,128                             | 1,574,296,443                       | 787,468,499       | -        | 6,882,338               | 6,882,338    |
| 64   | 21,969,315,560                                      | 529,139,464                                      | 678,058,905                      | 24,216,571                             | 1,678,230,017                       | 678,058,905       | -        | 5,499,877               | 5,499,877    |
| 65   | 23,474,409,565                                      | 534,463,644                                      | 577,179,146                      | 22,766,457                             | 1,798,888,567                       | 577,179,146       | -        | 4,344,891               | 4,344,891    |
| 66   | 25,207,816,173                                      | 539,831,703                                      | 485,557,254                      | 21,310,171                             | 1,936,883,308                       | 485,557,254       | -        | 3,392,278               | 3,392,278    |
| 67   | 27,177,663,759                                      | 545,243,847                                      | 403,614,679                      | 19,858,804                             | 2,092,827,426                       | 403,614,679       | -        | 2,616,981               | 2,616,981    |
| 68   | 29,392,261,550                                      | 550,700,280                                      | 331,433,146                      | 18,422,981                             | 2,267,361,306                       | 331,433,146       | -        | 1,994,400               | 1,994,400    |
| 69   | 31,860,467,009                                      | 556,201,207                                      | 268,827,976                      | 17,012,703                             | 2,461,178,169                       | 268,827,976       | -        | 1,501,321               | 1,501,321    |
| 70   | 34,592,005,705                                      | 561,746,830                                      | 215,362,740                      | 15,637,213                             | 2,675,048,296                       | 215,362,740       | -        | 1,116,227               | 1,116,227    |

<sup>1</sup> Projected as required by paragraph 41 of Statement 67

<sup>2</sup> Funded benefit payments discounted at the long-term expected rate of return, unfunded benefit payments discounted at the municipal bond index

**SECTION 5: GASB Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

**EXHIBIT 4**

**Development of Blended Discount Rate (Continued)**

| Year     | Projected Beginning Fiduciary Net | Projected Total Contributions <sup>1</sup> | Projected Benefit Payments | Projected Administrative Expense | Projected Investment Earnings | Benefit Payments: |          | PV of Benefit Payments: |                |
|----------|-----------------------------------|--|----------------------------|----------------------------------|-------------------------------|-------------------|----------|-------------------------|----------------|
|          | Position                          |  |                            |                                  |                               | Funded            | Unfunded | LT/ST Rate <sup>2</sup> | Single Equiv   |
| 71       | 37,597,800,879                    | 567,337,356                                | 170,423,364                | 14,304,870                       | 2,909,841,710                 | 170,423,364       | -        | 819,773                 | 819,773        |
| 72       | 40,890,251,711                    | 572,972,986                                | 133,217,874                | 13,023,059                       | 3,166,549,747                 | 133,217,874       | -        | 594,716                 | 594,716        |
| 73       | 44,483,533,511                    | 578,653,925                                | 102,865,210                | 11,798,114                       | 3,446,304,887                 | 102,865,210       | -        | 426,185                 | 426,185        |
| 74       | 48,393,828,999                    | 584,380,376                                | 78,473,421                 | 10,635,273                       | 3,750,395,648                 | 78,473,421        | -        | 301,742                 | 301,742        |
| 75       | 52,639,496,329                    | 590,152,543                                | 59,160,841                 | 9,538,655                        | 4,080,278,791                 | 59,160,841        | -        | 211,120                 | 211,120        |
| 76       | 57,241,228,167                    | 595,970,629                                | 44,076,533                 | 8,511,264                        | 4,437,590,851                 | 44,076,533        | -        | 145,977                 | 145,977        |
| 77       | 62,222,201,850                    | 601,834,837                                | 32,456,584                 | 7,555,015                        | 4,824,157,598                 | 32,456,584        | -        | 99,762                  | 99,762         |
| 78       | 67,608,182,686                    | 607,745,371                                | 23,625,729                 | 6,670,785                        | 5,242,001,972                 | 23,625,729        | -        | 67,395                  | 67,395         |
| 79       | 73,427,633,515                    | 613,702,434                                | 17,008,239                 | 5,858,480                        | 5,693,352,155                 | 17,008,239        | -        | 45,028                  | 45,028         |
| 80       | 79,711,821,385                    | 619,706,231                                | 12,119,102                 | 5,117,115                        | 6,180,650,171                 | 12,119,102        | -        | 29,777                  | 29,777         |
| 81       | 86,494,941,570                    | 625,756,965                                | 8,552,922                  | 4,444,917                        | 6,706,561,931                 | 8,552,922         | -        | 19,503                  | 19,503         |
| 82       | 93,814,262,628                    | 631,854,841                                | 5,984,557                  | 3,839,427                        | 7,273,988,437                 | 5,984,557         | -        | 12,665                  | 12,665         |
| 83       | 101,710,281,922                   | 638,000,063                                | 4,158,635                  | 3,297,611                        | 7,886,078,247                 | 4,158,635         | -        | 8,168                   | 8,168          |
| 84       | 110,226,903,986                   | 644,192,836                                | 2,876,690                  | 2,815,973                        | 8,546,241,785                 | 2,876,690         | -        | 5,244                   | 5,244          |
| 85       | 119,411,645,944                   | 650,433,365                                | 1,990,556                  | 2,390,671                        | 9,258,167,515                 | 1,990,556         | -        | 3,367                   | 3,367          |
| 86       | 129,315,865,596                   | 656,721,856                                | 1,383,436                  | 2,017,619                        | 10,025,840,348                | 1,383,436         | -        | 2,172                   | 2,172          |
| 87       | 139,995,026,745                   | 663,058,515                                | 970,117                    | 1,692,594                        | 10,853,562,190                | 970,117           | -        | 1,414                   | 1,414          |
| 88       | 151,508,984,739                   | 669,443,549                                | 690,858                    | 1,411,322                        | 11,745,974,308                | 690,858           | -        | 934                     | 934            |
| 89       | 163,922,300,416                   | 675,877,166                                | 501,309                    | 1,169,569                        | 12,708,082,048                | 501,309           | -        | 629                     | 629            |
| 90       | 177,304,588,752                   | 682,359,572                                | 372,949                    | 963,202                          | 13,745,281,830                | 372,949           | -        | 434                     | 434            |
| 91       | 191,730,894,003                   | 688,890,978                                | 284,302                    | 788,255                          | 14,863,390,567                | 284,302           | -        | 307                     | 307            |
| 92       | 207,282,102,991                   | 695,471,592                                | 220,756                    | 640,974                          | 16,068,677,697                | 220,756           | -        | 221                     | 221            |
| 93       | 224,045,390,550                   | 702,101,624                                | 174,880                    | 517,850                          | 17,367,899,689                | 174,880           | -        | 163                     | 163            |
| 94       | 242,114,699,133                   | 708,781,286                                | 139,271                    | 415,645                          | 18,768,337,491                | 139,271           | -        | 120                     | 120            |
| 95       | 261,591,262,994                   | 718,527,029                                | 109,802                    | 331,409                          | 20,277,837,057                | 109,802           | -        | 88                      | 88             |
| 96       | 282,587,185,868                   | 728,406,775                                | 86,318                     | 262,478                          | 21,905,086,965                | 86,318            | -        | 64                      | 64             |
| 97       | 305,220,330,813                   | 738,422,368                                | 66,593                     | 206,479                          | 23,659,221,795                | 66,593            | -        | 46                      | 46             |
| 98       | 329,617,701,904                   | 748,575,676                                | 49,967                     | 161,316                          | 25,550,084,479                | 49,967            | -        | 32                      | 32             |
| 99       | 355,916,150,776                   | 758,868,592                                | 37,022                     | 125,160                          | 27,588,281,079                | 37,022            | -        | 22                      | 22             |
| 100      | 384,263,138,265                   | 769,303,035                                | 26,523                     | 96,429                           | 29,785,239,933                | 26,523            | -        | 15                      | 15             |
| 101      | 414,817,558,280                   | 779,880,951                                | 18,109                     | 73,767                           | 32,153,275,396                | 18,109            | -        | 9                       | 9              |
| 102      | 447,750,622,752                   | 790,604,315                                | 12,099                     | 56,028                           | 34,705,656,438                | 12,099            | -        | 6                       | 6              |
| 103      | 483,246,815,377                   | 801,475,124                                | 7,914                      | 42,247                           | 37,456,680,618                | 7,914             | -        | 3                       | 3              |
| 104      | 521,504,920,958                   | 812,495,407                                | 5,086                      | 31,623                           | 40,421,753,819                | 5,086             | -        | 2                       | 2              |
| 105      | 562,739,133,475                   | 823,667,219                                | 3,205                      | 23,496                           | 43,617,476,130                | 3,205             | -        | 1                       | 1              |
| 106      | 607,180,250,123                   | 834,992,643                                | 1,980                      | 17,327                           | 47,061,734,379                | 1,980             | -        | 1                       | 1              |
| 107      | 655,076,957,838                   | 846,473,792                                | 1,215                      | 12,682                           | 50,773,801,840                | 1,215             | -        | 0                       | 0              |
| Total PV |                                   |  |                            |                                  |                               | □                 |          | 24,064,631,014          | 24,064,631,014 |

<sup>1</sup> Projected as required by paragraph 41 of Statement 67

<sup>2</sup> Funded benefit payments discounted at the long-term expected rate of return, unfunded benefit payments discounted at the municipal bond index

**SECTION 5: GASB Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

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**EXHIBIT 5**

**GASB 43 Summary of Required Supplementary Information**

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|                                      |   |
|--------------------------------------|---|
| <b>Valuation date</b>                | June 30, 2016   |
| <b>Actuarial cost method</b>         | Projected Unit Credit cost method                               |
| <b>Amortization method</b>           | Level percent of payroll, 30-year closed effective July 1, 2013 |
| <b>Remaining amortization period</b> | 27 years as of June 30, 2016                                    |
| <b>Asset valuation method</b>        | Market  |
| <b>Actuarial assumptions:</b>        |   |
| Investment rate of return            | 3.50%   |
| Inflation rate                       | 2.75%   |
| Medical cost trend rate              | 7.75% graded to 4.50% over 8 years                              |

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**SECTION 5: GASB Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

**EXHIBIT 6  
OPEB Solvency Test**

|  | <b>June 30, 2016</b> | <b>June 30, 2015</b> |
|--|----------------------|----------------------|
| 1. Actuarial accrued liability (AAL)               |                      |                      |
| a. Active member contributions                     | \$0                  | \$0                  |
| b. Retirees and beneficiaries                      | 1,259,012,073        | 1,064,847,161        |
| c. Active and inactive members (employer financed) | <u>963,534,246</u>   | <u>846,144,830</u>   |
| d. Total   | \$2,222,546,319      | \$1,910,991,991      |
| 2. Actuarial value of assets                       | <u>20,229,722</u>    | <u>21,713,159</u>    |
| 3. Unfunded actuarial accrued liability (UAAL)     | \$2,202,316,597      | \$1,889,278,832      |
| 3. Cumulative portion of AAL covered               |                      |                      |
| a. Active member contribution                      | 100.0%               | 100.0%               |
| b. Retirees and beneficiaries                      | 1.61%                | 2.04%                |
| c. Active and inactive members (employer financed) | 0.00%                | 0.00%                |



**SECTION 5: GASB Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

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**EXHIBIT 7**

**GASB 43 Required Supplementary Information – Determination of Annual Required Contribution (ARC)**

| Cost Element  | July 1, 2016         |              | July 1, 2015         |              |
|---|----------------------|--------------|----------------------|--------------|
|   | Amount               | % of Payroll | Amount               | % of Payroll |
| 1. Normal cost  | \$67,906,567         | 3.05%        | \$58,909,640         | 2.54%        |
| 2. Amortization of the unfunded actuarial accrued liability | <u>81,567,281</u>    | <u>3.66%</u> | <u>76,595,633</u>    | <u>3.30%</u> |
| 3. Total Annual Required Contribution (ARC)                 | <u>\$149,473,848</u> | <u>6.71%</u> | <u>\$135,505,273</u> | <u>5.84%</u> |
| 4. Projected payroll  | \$2,227,208,231      |              | \$2,322,254,343      |              |

**SECTION 5: GASB Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

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**EXHIBIT 8**

**GASB 43 Required Supplementary Information – Schedule of Employer Contributions**

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| <b>Fiscal Year Ending<br/>June 30,</b> | <b>Annual Required<br/>Contributions (ARC)</b> | <b>Actual<br/>Contributions</b> | <b>Percentage<br/>Contributed</b> |
|--|--|---------------------------------|-----------------------------------|
| 2007                                   | \$209,446,107                                  | \$65,000,000                    | 31.03%                            |
| 2008                                   | 150,033,070                                    | 65,000,000                      | 43.32%                            |
| 2009                                   | 171,880,428                                    | 65,000,000                      | 37.82%                            |
| 2010                                   | 186,231,574                                    | 65,000,000                      | 34.90%                            |
| 2011                                   | 215,797,617                                    | 65,000,000                      | 30.12%                            |
| 2012                                   | 218,842,221                                    | 65,000,000                      | 29.70%                            |
| 2013                                   | 216,163,148                                    | 65,000,000                      | 30.07%                            |
| 2014                                   | 165,115,403                                    | 65,000,000                      | 39.37%                            |
| 2015                                   | 135,728,777                                    | 65,000,000                      | 47.89%                            |
| 2016                                   | 135,505,273                                    | 65,000,000                      | 47.97%                            |

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**SECTION 5: GASB Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

**EXHIBIT 9**

**GASB 43 Required Supplementary Information – Schedule of Funding Progress**

| <b>Fiscal Year<br/>Ending<br/>June 30,</b> | <b>Actuarial<br/>Value of<br/>Assets<br/>(a)</b> | <b>Actuarial<br/>Accrued<br/>Liability<br/>(AAL)<br/>(b)</b> | <b>[Assets as a % of<br/>Actuarial<br/>Liability]<br/>Funded Ratio<br/>(c) = (a) / (b)</b> | <b>Unfunded AAL<br/>(UAAL)<br/>(d) = (b) - (a)</b> | <b>Active<br/>Member<br/>Payroll<br/>(e)</b> | <b>UAAL as a % of<br/>Active Member<br/>Payroll<br/>(f) = (d)/(e)</b> |
|--|--|--|--|--|--|---|
| 2007                                       | 47,401,758                                       | 2,022,007,643  | 2.34%  | 1,974,605,885                                      | 1,863,182,086                                | 105.98%   |
| 2008                                       | 44,989,385                                       | 2,407,122,492  | 1.87%  | 2,362,133,107                                      | 1,914,558,916                                | 123.38%   |
| 2009                                       | 49,691,750                                       | 2,670,282,662  | 1.86%  | 2,620,590,912                                      | 1,996,194,224                                | 131.28%   |
| 2010                                       | 34,857,732                                       | 2,864,877,305  | 1.22%  | 2,830,019,573                                      | 2,107,934,080                                | 134.26%   |
| 2011                                       | 31,324,572                                       | 3,071,516,739  | 1.02%  | 3,040,192,167                                      | 2,090,131,858                                | 145.45%   |
| 2012                                       | 34,124,958                                       | 3,110,316,263  | 1.10%  | 3,076,191,305                                      | 2,224,903,121                                | 138.26%   |
| 2013                                       | 35,796,904                                       | 2,386,105,927  | 1.50%  | 2,350,309,023                                      | 2,239,347,051                                | 104.96%   |
| 2014                                       | 35,977,444                                       | 1,938,855,895  | 1.86%  | 1,902,878,451                                      | 2,233,280,995                                | 85.21%  |
| 2015                                       | 21,713,159                                       | 1,910,991,991  | 1.14%  | 1,889,278,832                                      | 2,155,604,327                                | 87.64%  |
| 2016                                       | 20,229,722                                       | 2,222,546,319  | 0.91%  | 2,202,316,597                                      | 2,071,040,979                                | 106.34%   |

**SECTION 5: GASB Information for the Public School Teachers' Pension and Retirement Fund of Chicago**

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**EXHIBIT 10**

**GASB 43 Summary of Participant Data**

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|   | <b>June 30, 2016</b> | <b>June 30, 2015</b> |
|---|----------------------|----------------------|
| <b>Retirees and Beneficiaries</b>                                   |                      |                      |
| Number currently receiving health benefits                          | 18,063               | 17,490               |
| Average age   | 74.2                 | 73.7                 |
| Number entitled to health benefits but not currently receiving them | 10,235               | 10,575               |
| <b>Terminated employees who may be entitled to future benefits</b>  |                      |                      |
| Number  | 5,715                | 5,464                |
| Average age   | 47.2                 | 47.2                 |
| <b>Active Participants</b>  |                      |                      |
| Number  | 29,543               | 29,706               |
| Average age   | 41.5                 | 41.4                 |
| Average years of service  | 10.4                 | 10.3                 |

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