

# Policemen's Annuity and Benefit Fund of Chicago

GASB Statement Nos. 67 and 68  
Accounting and Financial  
Reporting for Pensions  
December 31, 2017



May 29, 2018

The Retirement Board of the  
Policemen's Annuity and Benefit Fund  
221 North LaSalle Street, Suite 1626  
Chicago, IL 60601-1404

Dear Members of the Board:

This report provides accounting and financial reporting information as of December 31, 2017, that is intended to comply with the Governmental Accounting Standards Board ("GASB") Statement Nos. 67 and 68 for the Policemen's Annuity and Benefit Fund of Chicago ("PABF" or "Fund"). These calculations have been made on a basis that is consistent with our understanding of these Statements.

GASB Statement No. 67 is the accounting standard that applies to the stand-alone financial reports issued by retirement systems. GASB Statement No. 68 establishes accounting and financial reporting for state and local government employers who provide their employees (including former employees) pension benefits through a trust.

Our calculation of the liability associated with the PABF benefits (described in Section E) was performed for the purpose of providing reporting and disclosure information that satisfies the requirements of GASB Statement Nos. 67 and 68. The Net Pension Liability is not an appropriate measure for measuring the sufficiency of plan assets to cover the estimated cost of settling the employer's benefit obligation. The Net Pension Liability is not an appropriate measure for assessing the need for or amount of future employer contributions. A calculation of the plan's liability for purposes other than satisfying the requirements of GASB Statement Nos. 67 and 68 may produce significantly different results. This report may be provided to parties other than PABF only in its entirety and only with the permission of PABF.

This report is based upon information, furnished to us by PABF, concerning retirement and ancillary benefits, active members, deferred vested members, retirees and beneficiaries, and financial data. If the understanding of this information is different, please let us know. This information was checked for internal consistency, but it was not audited.

This report complements the funding actuarial valuation report that was provided to PABF and should be considered in conjunction with that report. Please see the funding actuarial valuation report as of December 31, 2017, for additional discussion of the nature of actuarial calculations and more information related to participant data, economic and demographic assumptions, and benefit provisions.

The funding objective is to provide employer and employee contributions sufficient to provide the benefits of the Fund when due. Pursuant to Public Act ("P.A.") 99-0506, effective May 30, 2016, the funding policy was amended and requires City contributions to be equal to \$420 million in payment year 2016, \$464 million in payment year 2017, \$500 million in payment year 2018, \$557 million in payment year 2019 and \$579 million in payment year 2020. For payment years after 2020, the City is required to make level percent of pay contributions for plan years 2020 through 2055 that along with member contributions and investment earnings are expected to generate a projected funded ratio of 90% by plan year end 2055. The projections are based on an open group, level percent of pay financing and the Entry-Age Normal cost method.

This is a severely underfunded plan. Based on the results of the funding actuarial valuation report, the funded ratio is only 23.7% (using actuarial value of assets) and the unfunded liability is approximately \$10 billion as of December 31, 2017. The funded ratio based on the results of the funding actuarial valuation report is not projected to even reach 50% funded for another 26 years until 2043.

The funding policy defined in P.A. 99-0506 provides for fixed dollar City contributions for payment years 2016 to 2020, and level percent of pay contributions for years 2021 to 2055 that, along with member contributions and investment income, are projected to produce a funded ratio of 90% by 2055. This funding policy significantly defers contributions when compared to the provisions of the prior funding policy defined in P.A. 96-1495. The amount of annual contributions defined under P.A. 99-0506 does not even cover normal cost plus interest on the unfunded liability for the next 14 years. This means the unfunded liability is actually projected to increase to a high of \$11.8 billion in 2031, when contributions are finally sufficient to start reducing the unfunded liability.

We understand that P.A. 99-0506 defines the amount of City Contributions to the PABF. Nevertheless, we continue to recommend that the plan sponsor seriously consider making additional contributions (in excess of the statutory requirement) to ensure that there are sufficient assets available in the fund in all years to pay the promised benefits.

We also recommend that the Board perform projections which include pessimistic scenarios such as investment return lower than assumed, lower contributions received than expected, higher benefit payments than expected, etc., to more fully understand the impact of less than optimal future expectations.

This actuarial valuation assumes that the City will be able to make future contributions on a timely basis. We did not perform an analysis of the ability of the City to make future contributions. Such an analysis is not within the scope of our assignment or within our analytical skill set. Failure to receive City contributions on a timely basis could jeopardize the sustainability of the Fund.



The actuarial valuation results set forth in this report are based on the data and actuarial techniques described above, and upon the provisions of the Fund as of the actuarial valuation date. To the best of our knowledge, the information contained in this report is complete and accurate based on the statutes in effect as of December 31, 2017, and fairly presents the actuarial position of the Fund as of December 31, 2017, for purposes of complying with the financial reporting requirements under GASB Statement Nos. 67 and 68. All calculations have been made in conformity with generally accepted actuarial principles and practices as well as with the Actuarial Standards of Practice issued by the Actuarial Standards Board.

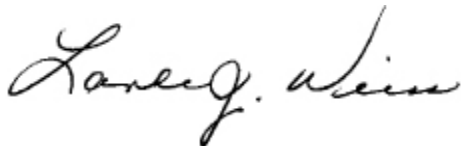
The actuarial assumptions used in this actuarial valuation are reasonable and appropriate for purposes of measuring the GASB Statement Nos. 67 and 68 pension liability as of December 31, 2017, under the current provisions.

This report should not be relied on for any purpose other than the purpose stated.

The signing actuaries are independent of the PABF and the plan sponsor.

Lance J. Weiss and Alex Rivera are Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Respectfully submitted,



By

Lance J. Weiss, EA, MAAA, FCA  
Senior Consultant



By

Alex Rivera, FSA, EA, MAAA, FCA  
Senior Consultant



Auditor's Note – This information is intended to assist in preparation of the financial statements of the Policemen's Annuity and Benefit Fund of Chicago. Financial statements are the responsibility of management, subject to the auditor's review. Please let us know if the auditor recommends any changes.



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## **SECTION A**

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### **EXECUTIVE SUMMARY**

# Executive Summary as of December 31, 2017

	<b>2017</b>
Actuarial Valuation Date	December 31, 2017
Measurement Date of the Net Pension Liability	December 31, 2017
Employer's Fiscal Year Ending Date (Reporting Date)	December 31, 2017

## Membership

Number of	
- Retirees and Beneficiaries	13,628
- Inactive, Nonretired Members	640
- Active Members	12,633
- Total	26,901
Covered Payroll	\$ 1,150,406,094

## Net Pension Liability

Total Pension Liability	\$ 13,454,462,563
Plan Fiduciary Net Position	3,122,066,293
Net Pension Liability	\$ 10,332,396,270
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	23.20%
Net Pension Liability as a Percentage of Covered Payroll	898.15%

## Development of the Single Discount Rate

Single Discount Rate Beginning of Year	7.07%
Single Discount Rate End of Year	7.00%
Long-Term Expected Rate of Investment Return	7.25%
Long-Term Municipal Bond Rate Beginning of Year*	3.78%
Long-Term Municipal Bond Rate End of Year*	3.31%
Last Year Trust Assets are Available to Pay Assets	2070

**Total Pension Expense** \$ 860,802,567

## Deferred Outflows and Deferred Inflows of Resources by Source to be recognized in Future Pension Expenses

	<b>Deferred Outflows of Resources</b>	<b>Deferred (Inflows) of Resources</b>
Difference Between Expected and Actual Non-Investment Experience	\$ 1,180,073	\$ (300,297,901)
Changes in Assumptions	272,072,978	-
Net Difference Between Projected and Actual Earnings on Pension Plan Investments	138,623,359	(168,001,658)
Total	\$ 411,876,410	\$ 468,299,559

\*Source: The rate at the beginning of the year is based on the rate as of December 29, 2016, from the "20-Bond GO Index" which is the Bond Buyer Index, general obligation, 20 years to maturity, mixed quality. In describing this index, the Bond Buyer notes that the bonds' average credit quality is roughly equivalent to Moody's Investors Service's Aa2 rating and Standard & Poor's Corps' AA.

The rate at the end of the year is the rate for fixed-income municipal bonds with 20 years to maturity that include only federally tax-exempt municipal bonds as reported in Fidelity Index's "20-Year Municipal GO AA Index" as of December 29, 2017. In describing this index, Fidelity notes that the municipal curves are constructed using option-adjusted analytics of a diverse population of over 10,000 tax exempt securities.



# Discussion

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## Accounting Standard

For pension plans that are administered through trusts or equivalent arrangements, Governmental Accounting Standards Board (“GASB”) Statement No. 67 establishes standards of financial reporting for separately issued financial reports and specifies the required approach for measuring the pension liability. Similarly, GASB Statement No. 68 establishes standards for state and local government employers (as well as non-employer contributing entities) to account for and disclose the net pension liability, pension expense and other information associated with providing retirement benefits to their employees (and former employees) on their basic financial statements.

The following discussion provides a summary of the information that is required to be disclosed under these accounting standards. A number of these disclosure items are provided in this report. However, certain non-actuarial information, such as notes regarding accounting policies and investments, is not included in this report and the retirement system and/or plan sponsor will be responsible for preparing and disclosing that information to comply with these accounting standards.

## Financial Statements

GASB Statement No. 68 requires state or local governments to recognize the net pension liability and the pension expense on their financial statements. The net pension liability is the difference between the total pension liability and the plan’s fiduciary net position. In traditional actuarial terms, this is analogous to the accrued liability less the market value of assets (not the smoothed actuarial value of assets that is often encountered in actuarial valuations performed to determine the employer’s contribution requirement).

Paragraph 57 of GASB Statement No. 68 states, “Contributions to the pension plan from the employer subsequent to the measurement date of the collective net pension liability and before the end of the employer’s reporting period should be reported as a deferred outflow of resources related to pensions.” The information contained in this report does not incorporate any contributions made to the PABF subsequent to the measurement date of December 31, 2017.

The pension expense recognized each fiscal year is equal to the change in the net pension liability from the beginning of the year to the end of the year, adjusted for deferred recognition of the liability and investment experience.

Pension plans that prepare their own, stand-alone financial statements are required to present two financial statements – a statement of fiduciary net position and a statement of changes in fiduciary net position in accordance with GASB Statement No. 67. The *statement of fiduciary net position* presents the assets and liabilities of the pension plan at the end of the pension plan’s reporting period. The *statement of changes in fiduciary net position* presents the additions, such as contributions and investment income, and deductions, such as benefit payments and expenses, and net increase or decrease in the fiduciary net position.

# Discussion

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## Notes to Financial Statements

GASB Statement No. 68 requires the notes of the employer's financial statements to disclose the total pension expense, the pension plan's liabilities and assets and deferred outflows and inflows of resources related to pensions.

GASB Statement Nos. 67 and 68 require the notes of the financial statements for the employers and pension plans to include certain additional information. The list of disclosure items should include:

- A description of benefits provided by the plan;
- The type of employees and number of members covered by the pension plan;
- A description of the plan's funding policy, which includes member and employer contribution requirements;
- The pension plan's investment policies;
- The pension plan's fiduciary net position, net pension liability and the pension plan's fiduciary net position as a percentage of the total pension liability;
- The net pension liability using a discount rate that is 1% higher and 1% lower than used to calculate the total pension liability and net pension liability for financial reporting purposes;
- Significant assumptions and methods used to calculate the total pension liability;
- Inputs to the discount rates; and
- Certain information about mortality assumptions and the dates of experience studies.

Retirement systems that issue stand-alone financial statements are required to disclose additional information in accordance with GASB Statement No. 67. This information includes:

- The composition of the pension plan's board and the authority under which benefit terms may be amended;
- A description of how fair value is determined;
- Information regarding certain reserves and investments, which include concentrations of investments greater than or equal to 5%, receivables and insurance contracts excluded from plan assets; and
- Annual money-weighted rate of return.

## Required Supplementary Information

GASB Statement No. 67 requires a 10-year fiscal history of:

- Sources of changes in the net pension liability;
- Information about the components of the net pension liability and related ratios, including the pension plan's fiduciary net position as a percentage of the total pension liability and the net pension liability as a percent of covered-employee payroll; and
- A comparison of the actual employer contributions to the actuarially determined contributions based on the plan's funding policy.

The tables may be built prospectively as the information becomes available.

# Discussion

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## Timing of the Valuation

An actuarial valuation to determine the total pension liability is required to be performed at least every two years. The net pension liability and pension expense should be measured as of the pension plan's fiscal year end (measurement date) on a date that is within the employer's prior fiscal year. If the actuarial valuation used to determine the total pension liability is not calculated as of the measurement date, the total pension liability is required to be rolled forward from the actuarial valuation date to the measurement date.

The total pension liability shown in this report is based on an actuarial valuation performed as of December 31, 2017, and a measurement date of December 31, 2017.

## Single Discount Rate

Projected benefit payments are required to be discounted to their actuarial present values using a Single Discount Rate that reflects: (1) a long-term expected rate of return on pension plan investments (to the extent that the plan's fiduciary net position is projected to be sufficient to pay benefits) and (2) a tax-exempt municipal bond rate based on an index of 20-year mixed maturity general obligation bonds with an average AA credit rating (which is published by Fidelity) as of the measurement date (to the extent that the contributions for use with the long-term expected rate of return are not met).

For the purpose of this actuarial valuation, the expected rate of return on pension plan investments is 7.25%; the municipal bond rate is 3.31% (based on the most recent date available on or before the measurement date from the "state & local bonds" rate from Federal Reserve statistical release (H.15)); and the resulting Single Discount Rate is 7.00%.

## Effective Date and Transition

GASB Statement Nos. 67 and 68 are effective for fiscal years beginning after June 15, 2013, and June 15, 2014, respectively; earlier application is encouraged by the GASB.

## Recent Legislation

**The following Public Act passed in 2017 by the 100<sup>th</sup> General Assembly, included changes to the Fund Provisions.**

Public Act 100-0334 effective August 25, 2017

Provides for the forfeiture of benefits for any person who otherwise would receive a survivor benefit who is convicted of any felony relating to or arising out of or in connection with the service of the member from whom the benefit results.

## Discussion

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### Assumption Changes

Actuarial assumptions remained unchanged from the prior actuarial valuation and reflect the results of the experience study performed for the period of January 1, 2009 through December 31, 2013, approved by the Board on March 16, 2015, and the investment return and inflation assumptions of 7.25% and 2.75%, respectively, first effective for the December 31, 2016, actuarial valuation.

## SECTION B

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### FINANCIAL STATEMENTS

Auditor's Note: This information is intended to assist in preparation of the financial statements of the Policemen's Annuity and Benefit Fund of Chicago. Financial statements are the responsibility of management, subject to the auditor's review. Please let us know if the auditor recommends any changes.

# Pension Expense under GASB Statement No. 68

## Fiscal Year Ended December 31, 2017

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### A. Expense

1. Service Cost Including Pension Plan Administrative Expense	\$	237,333,255
2. Interest on the Total Pension Liability		917,720,267
3. Current-Period Benefit Changes		-
4. Employee Contributions (made negative for addition here)		(103,011,250)
5. Projected Earnings on Plan Investments (made negative for addition here)		(202,188,331)
6. Other Changes in Plan Fiduciary Net Position		(97,239)
7. Recognition of Outflow/(Inflow) of Resources due to Liabilities		(68,905,362)
8. Recognition of Outflow/(Inflow) of Resources due to Assumption Changes		60,072,629
9. Recognition of Outflow/(Inflow) of Resources due to Assets		19,878,598
<b>10. Total Pension Expense</b>	<b>\$</b>	<b>860,802,567</b>

### B. Reconciliation of Net Pension Liability

<b>1. Net Pension Liability Beginning of Year</b>	<b>\$</b>	<b>10,248,072,884</b>
2. Pension Expense		860,802,567
3. Employer Contributions (made negative for addition here)		(494,483,191)
4. Change in Liability Experience Outflows/(Inflows) Recognized in Current Liabilities		(231,018,198)
5. Change in Assumption Changes Experience Outflows/(Inflows) Recognized in Current Liabilities		178,902,879
6. Change in Investment Experience Outflows/(Inflows) Recognized in Current Assets		(229,880,671)
<b>7. Net Pension Liability End of Year</b>	<b>\$</b>	<b>10,332,396,270</b>

# Statement of Outflows and Inflows Arising from Current and Prior Reporting Periods

## Fiscal Year Ended December 31, 2017

### A. Outflows and (Inflows) of Resources Recognized in Current and Future Pension Expenses as of Plan Year End December 31, 2017

Experience (Gain)/Loss	Original Balance	Date Established	Original Recognition Period/ Amortization Factor	Amount Recognized in Past Pension Expenses	Amount Recognized in Current Pension Expense	Deferred (Inflows) to be Recognized in Future Pension Expenses	Deferred Outflows to be Recognized in Future Pension Expenses
1. Differences Between Expected and Actual Non-Investment Experience	\$ (299,923,560)	December 31, 2017	5.8778	\$ -	\$ (51,026,728)	\$ (248,896,832)	\$ -
	1,801,353	December 31, 2016	5.7988	310,640	310,640	-	1,180,073
	(105,968,891)	December 31, 2015	5.8259	(36,378,548)	(18,189,274)	(51,401,069)	-
	<u>\$ (404,091,098)</u>		<u>5.8342</u>	<u>\$ (36,067,908)</u>	<u>\$ (68,905,362)</u>	<u>\$ (300,297,901)</u>	<u>\$ 1,180,073</u>
2. Assumption Changes	\$ 238,975,508	December 31, 2017	5.8778	\$ -	\$ 40,657,487	\$ -	\$ 198,318,021
	112,585,241	December 31, 2016	5.7988	19,415,142	19,415,142	-	73,754,957
	-	December 31, 2015	5.8259	-	-	-	-
	<u>\$ 351,560,749</u>		<u>5.8342</u>	<u>\$ 19,415,142</u>	<u>\$ 60,072,629</u>	<u>\$ -</u>	<u>\$ 272,072,978</u>
3. Difference Between Expected and Actual Investment Earnings	\$ (210,002,073)	December 31, 2017	5.0000	\$ -	\$ (42,000,415)	\$ (168,001,658)	\$ -
	74,326,665	December 31, 2016	5.0000	14,865,333	14,865,333	-	44,595,999
	235,068,400	December 31, 2015	5.0000	94,027,360	47,013,680	-	94,027,360
	<u>99,392,992</u>		<u>5.0000</u>	<u>\$ 108,892,693</u>	<u>\$ 19,878,598</u>	<u>\$ (168,001,658)</u>	<u>\$ 138,623,359</u>
<b>4. Total</b>	<b>\$ 46,862,643</b>			<b>\$ 92,239,927</b>	<b>\$ 11,045,865</b>	<b>\$ (468,299,559)</b>	<b>\$ 411,876,410</b>

### B. Deferred Outflows and Deferred (Inflows) of Resources by Year to be Recognized in Future Pension Expenses

Year Ending December 31	Differences Between Expected and Actual Non-Investment Experience	Assumption Changes	Differences Between Expected and Actual Investment Experience	Year Ending December 31	Deferred Outflows of Resources	Deferred (Inflows) of Resources	Net Deferred Outflows/(Inflows) of Resources
2018	\$ (68,905,362)	\$ 60,072,629	\$ 19,878,598	2018	\$ 122,262,282	\$ (111,216,417)	\$ 11,045,865
2019	(68,905,362)	60,072,629	19,878,598	2019	122,262,282	(111,216,417)	11,045,865
2020	(65,738,609)	60,072,629	(27,135,082)	2020	75,248,602	(108,049,664)	(32,801,062)
2021	(50,778,575)	56,167,018	(42,000,413)	2021	56,415,171	(93,027,141)	(36,611,970)
2022	(44,789,920)	35,688,073	-	2022	35,688,073	(44,789,920)	(9,101,847)
Thereafter	-	-	-	Thereafter	-	-	-
<b>Total</b>	<b>\$ (299,117,828)</b>	<b>\$ 272,072,978</b>	<b>\$ (29,378,299)</b>	<b>Total</b>	<b>\$ 411,876,410</b>	<b>\$ (468,299,559)</b>	<b>\$ (56,423,149)</b>

Numbers may not add due to rounding.

## Statement of Fiduciary Net Position

### Years Ended December 31, 2017, and 2016

	<u>2017</u>	<u>2016</u>
<b>Assets</b>		
Receivables		
Employer	\$ 486,151,716	\$ 449,291,702
Plan member	5,019,464	4,912,517
Due from Broker - net	139,702,728	114,331,679
Interest and dividends	5,822,061	5,990,470
Other receivables	-	-
Total receivables	<u>636,695,969</u>	<u>574,526,368</u>
Investments - at fair value		
Cash and short-term investments	156,035,875	94,260,366
Equities	1,485,918,492	1,331,825,429
Fixed income	796,069,079	785,404,131
Private equity	36,607,996	132,946,934
Real estate	72,809,905	74,675,801
Hedge funds	100,082,750	20,739,009
Infrastructure	26,855,526	26,030,921
Subtotal	<u>2,674,379,623</u>	<u>2,465,882,591</u>
Forward currency contracts	27,924,125	19,302,497
Securities lending cash collateral	143,322,338	177,836,930
Total investments - fair value	<u>2,845,626,086</u>	<u>2,663,022,018</u>
<b>Total assets</b>	<u>3,482,322,055</u>	<u>3,237,548,386</u>
<b>Liabilities and net position</b>		
Liabilities		
Due to brokers - net	207,254,031	186,906,407
Refunds, professional fees payable and other liabilities	6,734,372	5,124,516
OPEB liability	2,945,021	2,661,729
Securities lending cash collateral	143,322,338	177,836,930
Total liabilities	<u>360,255,762</u>	<u>372,529,582</u>
<b>Net Position - Restricted for Pension Benefits</b>	<u>\$ 3,122,066,293</u>	<u>\$ 2,865,018,804</u>



## Statement of Changes in Fiduciary Net Position Years Ended December 31, 2017, and 2016

	2017	2016
<b>Additions<sup>1</sup></b>		
Contributions		
Employer <sup>1</sup>	\$ 494,483,191	\$ 272,427,716
Plan Member	103,011,250	101,475,864
Other	97,239	1,412,770
Total Contributions	597,591,680	375,316,350
Investment Income		
Net appreciation in fair value of investments	371,090,440	105,369,451
Interest	19,437,993	17,485,571
Dividends	29,272,410	25,491,062
Real estate operating income - net	1,749,558	3,092,121
	421,550,401	151,438,205
Less investment expenses	(10,129,378)	(9,348,521)
Investment income - net	411,421,023	142,089,684
Securities lending		
Income	2,150,479	535,566
Lender (borrower) rebates	(1,254,123)	167,649
Management fees	(126,975)	(93,775)
Securities lending income - net	769,381	609,440
<b>Total additions</b>	<b>1,009,782,084</b>	<b>518,015,474</b>
<b>Deductions</b>		
Benefits <sup>1</sup>	737,873,928	696,491,103
Refund Payments	10,017,655	10,704,842
Administrative and OPEB expenses	4,843,012	4,749,762
<b>Total deductions</b>	<b>752,734,595</b>	<b>711,945,707</b>
<b>Net increase</b>	<b>257,047,489</b>	<b>(193,930,233)</b>
<b>Net Position Restricted for Pension Benefits</b>		
Beginning of year	2,865,018,804	3,058,949,037
End of year	<b>\$ 3,122,066,293</b>	<b>\$ 2,865,018,804</b>

<sup>1</sup> Excludes \$9,155,514 paid for health insurance supplement in 2016.

## SECTION C

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### REQUIRED SUPPLEMENTARY INFORMATION

Auditor's Note: This information is intended to assist in preparation of the financial statements of the Policemen's Annuity and Benefit Fund of Chicago. Financial statements are the responsibility of management, subject to the auditor's review. Please let us know if the auditor recommends any changes.

# Schedule of Changes in Net Pension Liability and Related Ratios Current Period Fiscal Year Ended December 31, 2017

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<b>A. Total Pension Liability</b>		
1. Service Cost Including Pension Plan Administrative Expense	\$	237,333,255
2. Interest on the Total Pension Liability		917,720,267
3. Changes of benefit terms		-
4. Difference between expected and actual experience of the Total Pension Liability		(299,923,560)
5. Changes of assumptions		238,975,508
6. Benefit payments, including refunds of employee contributions		(747,891,583)
7. Pension Plan Administrative Expenses		(4,843,012)
8. Net change in total pension liability		341,370,875
9. Total pension liability – beginning		13,113,091,688
10. Total pension liability – ending	<b>\$</b>	<b>13,454,462,563</b>
<b>B. Plan Fiduciary Net Position</b>		
1. Contributions – employer		494,483,191
2. Contributions – employee		103,011,250
3. Net investment income		412,190,404
4. Benefit payments, including refunds of employee contributions		(747,891,583)
5. Pension Plan Administrative Expense		(4,843,012)
6. Other		97,239
7. Net change in plan fiduciary net position		257,047,489
8. Plan fiduciary net position – beginning		2,865,018,804
9. Plan fiduciary net position – ending	<b>\$</b>	<b>3,122,066,293</b>
<b>C. Net Pension Liability</b>	<b>\$</b>	<b>10,332,396,270</b>
<b>D. Plan Fiduciary Net Position as a Percentage of the Total Pension Liability</b>		<b>23.20%</b>
<b>E. Covered-Employee Payroll</b>	<b>\$</b>	<b>1,150,406,094</b>
<b>F. Net Pension Liability as a Percentage of Covered Employee Payroll</b>		<b>898.15%</b>

## Schedules of Required Supplementary Information

### Schedule of Changes in Net Pension Liability and Related Ratios Multiyear

Fiscal year ending December 31,	2017	2016	2015	2014
<b>Total Pension Liability</b>				
Service Cost Including Pension Plan Administrative Expense	\$ 237,333,255	\$220,569,553	\$ 213,584,647	\$ 199,435,084
Interest on the Total Pension Liability	917,720,267	851,098,457	832,972,131	791,693,017
Benefit Changes	-	606,249,791	-	-
Difference between Expected and Actual Experience	(299,923,560)	1,801,353	(105,968,891)	-
Assumption Changes	238,975,508	112,585,241	-	845,070,287
Benefit Payments	(737,873,928)	(696,491,103)	(668,950,080)	(645,688,934)
Refunds	(10,017,655)	(10,704,842)	(7,826,847)	(8,991,636)
Pension Plan Administrative Expense	(4,843,012)	(4,749,762)	(4,508,519)	(4,240,625)
<b>Net Change in Total Pension Liability</b>	<b>341,370,875</b>	<b>1,080,358,688</b>	<b>259,302,441</b>	<b>1,177,277,193</b>
<b>Total Pension Liability - Beginning</b>	<b>13,113,091,688</b>	<b>12,032,733,000</b>	<b>11,773,430,559</b>	<b>10,596,153,366</b>
<b>Total Pension Liability - Ending (a)</b>	<b>\$ 13,454,462,563</b>	<b>\$ 13,113,091,688</b>	<b>\$ 12,032,733,000</b>	<b>\$ 11,773,430,559</b>
<b>Plan Fiduciary Net Position</b>				
Employer Contributions	494,483,191	272,427,716	572,836,100	\$ 177,417,827
Employee Contributions	103,011,250	101,475,864	107,626,311	95,675,538
Pension Plan Net Investment Income	412,190,404	142,699,124	(5,333,795)	181,901,293
Benefit Payments	(737,873,928)	(696,491,103)	(668,950,080)	(645,688,934)
Refunds	(10,017,655)	(10,704,842)	(7,826,847)	(8,991,636)
Pension Plan Administrative Expense	(4,843,012)	(4,749,762)	(4,508,519)	(4,240,625)
Other	97,239	1,412,770	3,091,545	740,305
<b>Net Change in Plan Fiduciary Net Position</b>	<b>257,047,489</b>	<b>(193,930,233)</b>	<b>(3,065,285)</b>	<b>(203,186,232)</b>
<b>Plan Fiduciary Net Position - Beginning</b>	<b>2,865,018,804</b>	<b>3,058,949,037</b>	<b>3,062,014,322</b>	<b>3,265,200,554</b>
<b>Plan Fiduciary Net Position - Ending (b)</b>	<b>\$ 3,122,066,293</b>	<b>\$ 2,865,018,804</b>	<b>\$ 3,058,949,037</b>	<b>\$ 3,062,014,322</b>
<b>Net Pension Liability - Ending (a) - (b)</b>	<b>10,332,396,270</b>	<b>10,248,072,884</b>	<b>8,973,783,963</b>	<b>8,711,416,237</b>
<b>Plan Fiduciary Net Position as a Percentage</b>				
<b>of Total Pension Liability</b>	23.20%	21.85%	25.42%	26.01%
<b>Covered Employee Payroll</b>	<b>\$ 1,150,406,094</b>	<b>\$ 1,119,526,987</b>	<b>\$ 1,086,607,979</b>	<b>\$ 1,074,333,318</b>
<b>Net Pension Liability as a Percentage</b>				
<b>of Covered Employee Payroll</b>	898.15%	915.39%	825.85%	810.87%

Ten fiscal years will be built prospectively.

Please see the following page for additional notes relating to the Schedule of Changes in Net Pension Liability and Related Ratios.

## **Schedules of Required Supplementary Information**

### **Additional Notes to the Schedule of Changes in Net Pension Liability and Related Ratios Multiyear**

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Beginning of year total pension liability for fiscal year 2017 used a Single Discount Rate of 7.07% and the benefit provisions, actuarial assumptions and funding policy in effect as of the December 31, 2016, funding actuarial valuation. The Single Discount Rate of 7.07% was based on a long-term expected rate of return on pension plan investments of 7.25% used in the December 31, 2016, funding actuarial valuation for the years 2016 through 2068 and a long-term municipal bond rate as of December 29, 2016, of 3.78% for subsequent years.

End of year total pension liability for fiscal year 2017 uses a Single Discount Rate of 7.00% and the benefit provisions, actuarial assumptions and funding policy in effect as of the December 31, 2017, funding actuarial valuation. The Single Discount Rate of 7.00% was based on a long-term expected rate of return on pension plan investments of 7.25% used in the December 31, 2017, funding actuarial valuation for the years 2017 through 2070 and a long-term municipal bond rate as of December 29, 2017, of 3.31% for subsequent years.

The increase in the total pension liability for fiscal year 2017 due to assumption changes and methods includes the impact of the change in the municipal bond rate from December 29, 2016 to December 29, 2017. Changes in actuarial assumptions and methods led to the change in the Single Discount Rate from 7.07% to 7.00% (based on the long-term expected rate of return on pension plan investments of 7.25% used in the December 31, 2016, funding actuarial valuation and 7.25% used in the December 31, 2017, funding actuarial valuation and the long-term municipal bond rate of 3.78% as of December 29, 2016, and 3.31% as of December 29, 2017, respectively). This change was measured at the end of the year using the benefit provisions in effect as of December 31, 2017.

## Schedules of Required Supplementary Information

### Schedule of the Net Pension Liability Multiyear

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FY Ending December 31,	Total Pension Liability	Plan Net Position	Net Pension Liability	Plan Net Position as a % of Total Pension Liability	Covered Payroll <sup>1</sup>	Net Pension Liability as a % of Covered Payroll
2014	\$ 11,773,430,559	\$ 3,062,014,322	\$ 8,711,416,237	26.01%	\$ 1,074,333,318	810.87%
2015	12,032,733,000	3,058,949,037	8,973,783,963	25.42%	1,086,607,979	825.85%
2016	13,113,091,688	2,865,018,804	10,248,072,884	21.85%	1,119,526,987	915.39%
2017	13,454,462,563	3,122,066,293	10,332,396,270	23.20%	1,150,406,094	898.15%

<sup>1</sup> Covered payroll is the amount in force as of the actuarial valuation date and likely differs from actual payroll paid during the fiscal year.

Ten fiscal years will be built prospectively.

## Schedule of Contributions Multiyear Last 10 Fiscal Years

FY Ending December 31,	Actuarial Determined Contribution <sup>1</sup>	Actual Contribution	Contribution Deficiency (Excess)	Covered Payroll <sup>2</sup>	Actual Contribution as a % of Covered Payroll	Statutory Contribution <sup>3</sup>
2008	\$ 318,234,870	\$ 172,835,805	\$ 145,399,065	\$ 1,023,580,667	16.89%	\$175,080,814
2009	339,488,187	172,043,784	167,444,403	1,011,205,359	17.01%	177,333,569
2010	363,624,570	174,500,507	189,124,063	1,048,084,301	16.65%	177,060,837
2011	402,751,961	174,034,600	228,717,361	1,034,403,526	16.82%	176,068,606
2012	431,010,173	197,885,552	233,124,621	1,015,170,686	19.49%	204,329,314
2013	474,177,604	179,521,259	294,656,345	1,015,426,128	17.68%	182,716,690
2014	491,651,208	178,158,132	313,493,076	1,074,333,318	16.58%	178,773,877
2015	785,500,836	575,927,645	209,573,191	1,086,607,979	53.00%	410,558,466
2016	785,695,084	273,840,486	511,854,598	1,119,526,987	24.46%	454,844,486
2017	910,938,497	494,580,430	416,358,067	1,150,406,094	42.99%	500,000,000

<sup>1</sup> The PABF Statutory Funding Policy does not conform to Actuarial Standards of Practice; therefore, for fiscal years 2015 and after, the actuarially determined contribution is equal to the normal cost plus a 30-year level dollar amortization of the unfunded actuarial liability. Prior to 2015 the actuarially determined contribution was equal to the "ARC" which was equal to the normal cost plus a 30-year open level percent amortization of the unfunded actuarial liability.

<sup>2</sup> Covered payroll shown is the amount in force as of the actuarial valuation date and likely differs from actual payroll paid during the fiscal year.

<sup>3</sup> Excludes amounts paid for health insurance supplement beginning in 2006.

# Notes to Schedule of Contributions

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**Valuation Date:** December 31, 2017

**Methods and Assumptions Used to Determine Contribution Rates as of the Valuation Date:**

Actuarial Cost Method	Entry-Age Normal
Amortization Method	Prior to 2015, the total City contribution was generated by a tax equal to 2.00 times the contributions by the policemen to the Fund two years prior to the year of the tax levy. For tax levy years 2015-2019, the statutory contributions are equal \$420 million, \$464 million, \$500 million, \$557 million and \$579 million respectively. For tax levy years on and after 2020, the statutory contributions are equal to a level percentage of pay contribution determined so that the Plan attains a 90 percent funded ratio by the end of 2055 on an open group basis.
Remaining Amortization Period	Not Applicable. An amortization payment is not directly calculated. The amortization payment is the difference between the total statutory contribution and the employer normal cost contribution.
Asset Valuation Method	5-year smoothed market
Inflation	2.75 percent as of the December 31, 2017, actuarial valuation.
Salary Increases	Salary increase rates based on wage inflation rate of 3.75% plus service based increases consistent with bargaining contracts.
Postretirement Benefit Increases	A retiree born before January 1, 1966, with at least 20 years of service or receiving a mandatory retirement minimum annuity, receives an increase of 3 percent of the original annuity, starting on the first of the month following the first anniversary of his retirement or the first of the month following attainment of age 55, whichever is later, and shall not be subject to a 30 percent maximum increase. For retirees born on and after January 1, 1966, automatic increases are 1.5 percent of the original annuity, commencing at age 60, or the first anniversary of retirement, if later, to a maximum of 30 percent. For participants who first became members on or after January 1, 2011, increases are equal to the lesser of 3.00 percent and 50 percent of CPI-U of the original benefit, commencing at age 60.
Investment Rate of Return	7.25 percent as of the December 31, 2017, actuarial valuation.
Retirement Age	Experience-based table of rates that are specific to the type of eligibility condition. Last updated for the December 31, 2014, actuarial valuation pursuant to an experience study of the period January 1, 2009 through December 31, 2013.
Mortality	Post-Retirement Healthy mortality rates: Sex distinct Retirement Plans 2014 Healthy Annuitant mortality table weighted 108% for males and 97% for females. Pre-Retirement mortality rates: Sex distinct Retirement Plans 2014 Total Employee mortality table weighted 85% for males and 115% for females. Disabled Mortality: Sex distinct Retirement Plans 2014 Healthy Annuitant mortality table weighted 115% for males and 115% for females.

**Other Information:**

Notes The actuarial valuation is based on the statutes in effect as of December 31, 2017.

**Methods and Assumptions Used for Accounting Purposes as of the Valuation Date:**

Actuarial Cost Method	Entry-Age Normal
Asset Valuation Method	Market value
Discount Rate	7.07 percent as of the December 31, 2016, actuarial valuation. 7.00 percent as of the December 31, 2017, actuarial valuation.



## SECTION D

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### NOTES TO FINANCIAL STATEMENTS

Auditor's Note: This information is intended to assist in preparation of the financial statements of the Policemen's Annuity and Benefit Fund of Chicago. Financial statements are the responsibility of management, subject to the auditor's review. Please let us know if the auditor recommends any changes.

# Sensitivity of Net Pension Liability to the Single Discount Rate Assumptions

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## Single Discount Rate

A Single Discount Rate of 7.00% was used to measure the total pension liability. This Single Discount Rate was based on an expected rate of return on pension plan investments of 7.25% and a municipal bond rate of 3.31%. The projection of cash flows used to determine this Single Discount Rate assumed that plan member contributions will be made at the current contribution rate and that employer contributions will be made under the statutory funding policy. Based on these assumptions, the pension plan's fiduciary net position and future contributions were sufficient to finance the benefit payments only through the year 2070. As a result, the long-term expected rate of return on pension plan investments was applied to projected benefit payments through the year 2070, and the municipal bond rate was applied to all benefit payments after that date.

Regarding the sensitivity of the net pension liability to changes in the Single Discount Rate, the following presents the plan's net pension liability, calculated using a Single Discount Rate of 7.00%, as well as what the plan's net pension liability would be if it were calculated using a Single Discount Rate that is one percent lower or one percent higher:

### SENSITIVITY OF NET PENSION LIABILITY TO THE SINGLE DISCOUNT RATE ASSUMPTION

1% Decrease	Current Single Discount	1% Increase
6.00%	Rate Assumption	8.00%
7.00%		
\$ 11,944,827,526	\$ 10,332,396,270	\$ 8,978,201,794

## Summary of Population Statistics

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Inactive Plan Members or Beneficiaries Currently Receiving Benefits	13,628
Inactive Plan Members Entitled to But Not Yet Receiving Benefits	640
Active Plan Members	<u>12,633</u>
Total Plan Members	26,901

*Additional information about the member data used is included in the December 31, 2017, funding actuarial valuation report.*

## **SECTION E**

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### **SUMMARY OF BENEFITS**

# Summary of Benefits

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## Plan Descriptions (as of December 31, 2017)

### **PARTICIPANTS**

An employee in the police department of the City of Chicago appointed and sworn or designated by law as a peace officer with the title of policeman, policewoman, chief surgeon, police surgeon, police dog catcher, police kennelman, police matron and members of the police force of the police department.

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### **SERVICE**

In computing service rendered by a police officer, the following periods shall be counted, in addition to all periods during which he performed the duties of his position, as periods of service for annuity purposes only: All periods of (a) vacation; (b) leave of absence with pay; (c) military service; (d) disability for which the police officer receives disability benefit. The calculation of service is based on a day-to-day basis for most purposes. For the purpose of calculating benefits under the Dominant Formula, one year of Service is credited for a year in any portion of which a police officer is compensated.

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### **RETIREMENT**

#### **Eligibility**

Attainment of age 50 with at least 10 years of service.

*For participants who first became members on or after January 1, 2011, attainment of age 55 with at least 10 years of service. Participants may retire at attainment of age 50 with 10 years of service with a reduced benefit.*

#### **Mandatory**

Effective in plan year 2003, retirement is mandatory for a participant who has attained age 63.

#### **Accumulation Annuity**

At age 50 or more, with 10 or more years of service, the employee is entitled to an annuity based on the sums accumulated for age and service annuity plus 1/10 of the sum accumulated from the contributions by the City for the age and service annuity for each completed year of service after the first 10 years. At age 50 or more with 20 or more years, the employee is entitled to an annuity based on all sums accumulated.

## Summary of Benefits

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### **Formula Minimum Annuity**

While there are several alternative formulas available with 20 or more years of service, the Dominant Formula is 50% of highest average salary (including duty availability pay) in 48 consecutive months within the last 10 years of service plus 2.5% for each year or fraction of service over 20 years, limited to 75% of average salary.

### **Mandatory Retirement Minimum Annuity**

A police officer who is required to withdraw from service due to attainment of mandatory retirement age who has less than 20 years of service credit may elect to receive an annuity equal to 30% of average salary for the first 10 years of service, plus 2% of average salary for each completed year of service in excess of 10, to a maximum of 48% of average salary. This benefit qualifies for post retirement increases.

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### **Post-Retirement Increase**

A retiree born before January 1, 1966, with at least 20 years of service or receiving a mandatory retirement minimum annuity, receives an increase of 3% of the original annuity, starting on the first of the month following the first anniversary of his retirement or the first of the month following attainment of age 55, whichever is later, and shall not be subject to a 30% maximum increase. For retirees born on and after January 1, 1966, automatic increases are 1.5% of the original annuity, commencing at age 60, or the first anniversary of retirement, if later, to a maximum of 30%.

*For participants who first became members on or after January 1, 2011, increases are equal to the lesser of 3.00% and 50% of CPI-U of the original benefit, commencing at age 60.*

## Summary of Benefits

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### **Minimum Annuity**

Beginning with the monthly annuity payment due on January 1, 2016, the fixed and granted monthly annuity payment for any policeman who retired from the service before January 1, 2016, at age 50 or over with 20 or more years of service, and for any policeman who retired from service due to termination of disability and who is entitled to an annuity on January 1, 2016, shall be no less than 125% of the Federal Poverty Level.

*For participants who first became members on or after January 1, 2011, the member is entitled to an annuity based on an accrual rate of 2.5% of the final average salary for each fraction of service. Maximum is 75% of the final average salary. Final average salary is calculated using salary from the eight highest consecutive years within the last 10 years of service prior to retirement. Pensionable salary is limited to \$106,800 in 2011, increased by the lesser of 3% and one-half of the annual unadjusted percentage increase in the Consumer Price Index-U (but not less than zero) as measured in the preceding 12-month period ending with the September preceding the November 1, which is the date that the new amount will be calculated and made available to the pension funds.*

*For participants who first became members on or after January 1, 2011, who retire after age 50 but before age 55 is attained, the member is entitled to an annuity based on an accrual rate of 2.5% of the final average salary for each fraction of service, reduced by one half of one percent per month for retirement prior to age 55, subject to a maximum benefit of 75%.*

### **Reversionary Annuity**

A member, prior to retirement, may elect to reduce his own annuity, and provide a reversionary annuity, to begin upon the officer's death, for the officer's spouse.

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## Summary of Benefits

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### ***SURVIVOR INCOME BENEFITS PAYABLE ON DEATH***

***Death in Service (Non-Duty):*** Generally, a money-purchase benefit is provided, based on total salary deductions and City contributions. However, if a policeman dies in service after December 31, 1985, with at least 1.5 years of service, the widow's annuity is the greater of (a) 30% of the annual maximum salary attached to the classified civil service position of a first class patrolman at the time of his death (without dollar limit) or (b) 50% of the benefit accrued by the policeman at date of death.

The lifetime benefit is payable until death.

***Death in Service (Duty Related)***

***Compensation Annuity***

75% of the member's salary attached to the civil service position that would ordinarily have been paid to such member as though in active discharge of his duties at the time of death payable until the date the policeman would have attained age 63.

***Supplemental Annuity***

Payable for life and is equal to the difference between the money purchase annuity for the spouse and an amount equal to 75% of the annual salary (including all salary increases and longevity raises) the police officer would have been receiving when he attained age 63 if the police officer had continued in service at the same rank last held in the department.

***Death after Retirement***

If a police officer retires on or after January 1, 1986, and subsequently dies, the widow's annuity is 40% before 1988 and 50% on and after January 1, 1988, of the retired policeman's annuity at the time of death (without dollar limit).

***Maximum Annuity***

\$500 a month (after discount for age difference) under both the accumulation method and the old formula method. There is no dollar limit on the 30%, 40% or 50% benefit.



## Summary of Benefits

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**Minimum Annuity** The minimum widow's annuity shall be no less than 125% of the Federal Poverty Level.

*For participants who first became members on or after January 1, 2011, widow benefits are equal to 66-2/3% of the officer's earned annuity at the date of death. Automatic increases to the annuity are equal to the lesser of 3.00% and 50% of CPI-U, commencing when the survivor reaches age 60, and applied to the original granted retirement annuity.*

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### **CHILDREN'S ANNUITIES**

**Eligibility** Payable at death of the policeman to all unmarried children less than 18 years of age.

**Benefit** 10% of the annual maximum salary of a first class patrolman during widow (widower) life, 15% otherwise.

**Payable Until** Age 18. If the child is disabled, benefit is payable for life or as long as such disablement exists.

**Family Maximum** 60% (non-duty death) or 100% (duty death) of the salary that would ordinarily been paid to the policeman, if he had been in the active discharge of his duties.

**Parent's Annuities Eligibility** Payable to a dependent parent at the death of a policeman who is in either active service, or receiving a disability benefit, or on leave of absence, or in receipt of an annuity granted after 20 years of service, or waiting to start receiving an annuity granted for 20 years of service. The benefit is only payable if there are no surviving spouses or children eligible for benefits.

**Benefit** 18% of the current salary attached to the rank at separation from service.

**Payable until** Death of the dependent parent.

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### **DUTY DISABILITY BENEFIT**

**Eligibility** Disabling condition incurred in the performance of duty.

## Summary of Benefits

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**Benefit** 75% of salary at the time the disability is allowed plus \$100.00 per month for each unmarried child less than age 18, (total amount of child's benefits shall not exceed 25% of salary). Beginning January 1, 2000, after seven years of payment, the benefit shall not be less than 60% of the current salary attached to the rank held by the policemen at the time of disability. Payable to employee's age 63 or by operation of law, whichever is later. Salary deductions are contributed by the City.

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### ***OCCUPATIONAL DISEASE DISABILITY BENEFIT***

**Eligibility** Heart attack or any disability heart disease after 10 years of service.

**Benefit** 65% of salary attached to the rank held by the police officer at the time of his or her removal from the police department payroll with a minimum after 10 years of 50% of the current salary attached to the rank. Each natural or legally adopted unmarried child of the officer under the age of 18 is entitled to a benefit of \$100 per month. This benefit is not terminated at age 18 if the child is then dependent by reason of physical or mental disability. Salary deductions are contributed by the City.

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### ***ORDINARY DISABILITY BENEFIT***

**Eligibility** Disabling condition other than duty or occupational related.

**Benefit** 50% of salary at the time of injury, payable for a period not more than 25% of service (excluding any previous disability time) rendered prior to injury, nor more than five years. Disability shall cease at age 63. Salary deductions are contributed by the City.

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### ***DEATH BENEFIT***

**Eligibility** Payable upon the death of a police officer whose death occurs while in active service; on authorized leave of absence; within 60 days of receipt of salary; while receiving duty or ordinary disability benefit; occurring within 60 days of termination of such benefit; or occurring on retirement while in receipt of annuity and separation was effective after 20 years of service. This benefit is payable to beneficiaries or, if none, to estate.

## Summary of Benefits

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### Benefit

<b>Death in Service:</b>	<b>Age at Death</b>	<b>Benefit</b>
	49 and under	\$12,000
	50-62	\$12,000 less \$400 for each year by which age at death exceeds 49

<b>Death after Retirement:</b>	<b>Age at Death</b>	<b>Benefit</b>
	50 and over	\$6,000

If death results from injury incurred in performance of duty before retirement on annuity, the benefit payable is \$12,000 regardless of the attained age.

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### REFUNDS

**Policemen** Without regard to service and under age 50, or with less than 10 years of service and under age 57 at withdrawal: a refund of all salary deductions together with 1.5% simple interest until the date of withdrawal.

**For Spouse's Annuity** Upon retirement an unmarried policeman will receive a refund of contributions for spouse's annuity, accumulated at 3% compounded annually.

**Of Remaining Amounts** If at death of a retired policeman the total member contributions paid while active exceed the total retirement benefits paid to date of death, the difference is payable.

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### CONTRIBUTIONS

<b>Salary Deductions</b>	Employee	7 %	
	Spouse	1½%	
	Annuity Increase	½%	
		9 %	
<b>City Contributions <sup>1</sup></b>	Employee	9-5/7%	
	Spouse	2%	
	Annuity Increase	½%	Unallocated
		12-3/14%	

<sup>1</sup> Credited to Participant's Accumulation Annuity and Widow's Annuity Account

## Summary of Benefits

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In addition to the above contributions, a contribution is made to support the Death Benefit. Policemen contribute \$2.50 per month. City contributes a total of \$224,000 for all policemen.

Prior to 2015, the total City contribution is generated by a tax equal to double the contributions by the policemen to the Fund two years prior to the year of the tax levy.

Under P.A. 99-0506, City contributions are equal to \$420 million in payment year 2016, \$464 million in payment year 2017, \$500 million in payment year 2018, \$557 million in payment year 2019 and \$579 million in payment year 2020. For payment years after 2020, the City is required to make level percent of pay contributions for plan years 2020 through 2055 that along with member contributions and investment earnings are expected to generate a projected funded ratio of 90% by plan year end 2055.

**"PICK UP" OF EMPLOYEE  
SALARY DEDUCTIONS**

Beginning January 1, 1982, the employee contributions were "picked up" by the employer. The W-2 salary is therefore reduced by the amount of contribution. For pension purposes the salary remains unchanged. Income tax will be paid when a refund or annuity is received. For the purpose of benefits, refunds or contributions, these contributions will be treated as employee contributions.

**SALARY CAP AND COLA DEVELOPMENT FOR MEMBERS HIRED ON OR AFTER JANUARY 1, 2011**

Year Ending	CPI-U	½ CPI-U	COLA	Pensionable Earnings
2011			3.00%	\$106,800.00
2012	3.90%	1.95%	1.95%	\$108,882.60
2013	2.00%	1.00%	1.00%	\$109,971.43
2014	1.20%	0.60%	0.60%	\$110,631.26
2015	1.70%	0.85%	0.85%	\$111,571.63
2016	0.00%	0.00%	0.00%	\$111,571.63
2017	1.50%	0.75%	0.75%	\$112,408.42
2018	2.20%	1.10%	1.10%	\$113,644.91

## **SECTION F**

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### **ACTUARIAL COST METHOD AND ACTUARIAL ASSUMPTIONS**

# Actuarial Cost Method and Actuarial Assumptions

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## I. ACTUARIAL COST METHOD

An Actuarial Cost Method is a set of techniques used by the actuary to develop contribution levels under a retirement plan. The Actuarial Cost Method used in this valuation for statutory funding and State reporting purposes and GASB accounting purposes is the Entry Age Normal cost method.

Under the Entry Age Normal Cost Method, each participant's projected benefit is allocated on a level percent of pay basis from entry age to assumed exit age. The Actuarial Accrued Liability is the portion of the present value associated with pay prior to the valuation date. The Normal Cost is the portion of the present value associated with pay during the current plan year.

To the extent that current assets and future Normal Costs do not support participants' expected future benefits, an Unfunded Actuarial Accrued Liability ("UAAL") develops. The UAAL is generally amortized over a fixed period of time (e.g., 30 years) from the date incurred. The total contribution developed under this method is the sum of the Normal Cost and the payment toward the UAAL.

## II. CURRENT ACTUARIAL ASSUMPTIONS

The current actuarial assumptions except for the investment return and general inflation assumptions were adopted and became effective December 31, 2014, and were based on an experience study for the period January 1, 2009 to December 31, 2013. The investment return and general inflation assumptions were adopted and became effective December 31, 2016.

### A. Demographic Assumptions

Mortality:	<p><b>Pre-Retirement mortality rates:</b> Sex distinct Retirement Plans 2014 Total Employee mortality table weighted 85% for males and 115% for females.</p> <p><b>Post-Retirement Healthy mortality rates:</b> Sex distinct Retirement Plans 2014 Healthy Annuitant mortality table weighted 108% for males and 97% for females. When compared to observed experience, the recommended rates include a 23% margin for future mortality improvements.</p>
Disabled Mortality:	Sex distinct Retirement Plans 2014 Healthy Annuitant mortality table weighted 115% for males and 115% for females.

## Actuarial Cost Method and Actuarial Assumptions

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Rate of Disability: Rates at which members are assumed to become disabled under the provisions of the Fund. Sample rates assumed are as follows:

<u>Attained Age</u>	<u>Rate</u>
22	.0003
27	.0007
32	.0007
37	.0020
42	.0030
47	.0040
52	.0050
57	.0060
62	.0060

The assumed distribution of disability types is assumed to be as follows:

Duty Disability	55%
Occupational Disease Disability	10%
Ordinary Disability	35%

Rate of Retirement: Rates at which members are assumed to retire under the provisions of the Fund. The rates assumed are as follows:  
For members hired before January 1, 2011:

<u>Attained Age</u>	<u>Rate <sup>1</sup></u>
50	.05
51	.05
52	.05
53	.05
54	.05
55	.19
56	.19
57	.19
58	.25
59	.25
60	.25
61	.30
62	.30
63	1.00

<sup>1</sup> Only for members eligible for a formula annuity.

# Actuarial Cost Method and Actuarial Assumptions

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For members hired on or after January 1, 2011:

<u>Attained Age</u>	<u>Rate <sup>1</sup></u>
50	.02
51	.02
52	.02
53	.02
54	.03
55	.21
56	.21
57	.21
58	.27
59	.27
60	.25
61	.30
62	.30
63	1.00

<sup>1</sup> Only for members eligible for a formula annuity.

Turnover Rates:

The following sample rates exemplify the table:

<u>Years of Service</u>	<u>Rate</u>
0	0.030
1	0.028
2	0.020
3	0.015
4-5	0.010
6-10	0.009
11	0.008
12	0.007
13-24	0.006

## ***B. Economic Assumptions***

Investment Return Rate: 7.25% per annum effective as of December 31, 2016.

General Inflation: The 7.25% Investment Return Rate assumption is comprised of a 2.75% inflation assumption and a 4.50% real rate of return assumption for pension.



## Actuarial Cost Method and Actuarial Assumptions

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Future Salary Increases: Assumed rates of individual salary increase at 3.75% per year, plus an additional percentage based on the following service scale:

<u>Completed Years of Service *</u>	<u>Scale</u>
1	0.3625
2	0.0325
3	0.0325
4	0.0325
5	0.0225
6-9	0.0000
10	0.0225
11-14	0.0000
15	0.0225
16-19	0.0000
20	0.0225
21-24	0.0000
25	0.0225
26-29	0.0000
30	0.0225
Over 30	0.0000

\* Includes increases at 12 and 18 months of service.

Asset Value: For Book value of Assets, bonds are at amortized value and stocks are at cost.

For statutory funding, the actuarial value of assets is smoothed by recognizing each year's difference between actual and expected investment return at the rate of 20% per year over a five-year period.

The actuarial value of assets was marked to the market value as of January 1, 2012, and is smoothed by using a five-year phase-in of each year's unexpected investment gains and losses.

# Actuarial Cost Method and Actuarial Assumptions

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## C. Other Assumptions

**Marital Status:** It is assumed that 85% of members have an eligible spouse. The male spouse is assumed to be three years older than the female spouse. No assumption is made about other dependents.

**Beneficiary COLA Approximation:** For current retirees with eligible reversionary annuitants, liabilities are calculated for the beneficiary's benefit by using 50 percent of the retiree's benefit as of the valuation date plus 35 percent of the retiree's future increase in benefit from the COLA each year after the valuation date.

## D. Projection Assumptions

The projections under the provisions of P.A. 99-0506 were based on the following assumptions and methods:

**Active Population:** Active members who terminate, retire, become disabled or die during the year are replaced by new entrants such that the number of active members remains level during the projection period based on the most recent actuarial valuation. The number of active members as of the actuarial valuation at December 31, 2017, is 12,633.

**New Entrant Profile:** The entry age of future new entrants, which is summarized below, is based on the profile of current active members hired over the last five years with one or more years of service as of December 31, 2016. These members were hired from January 1, 2013, through December 31, 2016.

Entry Age	Number
20 to 25	326
25 to 30	850
30 to 35	462
35 to 40	205
40 to 45	2

Approximately 80% of the new entrants are assumed to be male.

**New Entrant Pay:** Based on the most recent employment contract, new entrants were assumed to earn \$48,078 for the plan year ending December 31, 2017. This amount does not include duty availability pay. The new entrant pay for members hired after 2018 is assumed to increase by the wage inflation assumption of 3.75% plus duty availability pay after three years, increased by CPI compounded.

## Actuarial Cost Method and Actuarial Assumptions

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**New Entrant Pay Increases:** Pay for a specific new entrant is assumed to increase in the future by the wage inflation and the service based increases disclosed in this actuarial valuation.

The projections assume a pay cap of \$113,644.91 for plan year 2018, increasing by 1.375% per year after plan year 2018. The annual increase of 1.375% per year is based on 50% of the CPI-U increase which is assumed to be 2.75% per year.

**Administrative Expenses:** Statutory funding projections include an explicit administrative expense assumption of \$4,843,000 for plan year end December 31, 2017, increased by 2.75% per year.

## **SECTION G**

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### **CALCULATION OF THE SINGLE DISCOUNT RATE**

## Calculation of the Single Discount Rate

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GASB Statement Nos. 67 and 68 includes a specific requirement for the discount rate that is used for the purpose of the measurement of the Total Pension Liability. This rate considers the ability of the fund to meet benefit obligations in the future. To make this determination, employer contributions, employee contributions, benefit payments, expenses and investment returns are projected into the future. The Plan Net Position (assets) in future years can then be determined and compared to its obligation to make benefit payments in those years. As long as assets are projected to be on hand in a future year, the assumed valuation discount rate is used. In years where assets are not projected to be sufficient to meet benefit payments, the use of a municipal bond rate is required, as described in the following paragraph.

The Single Discount Rate (“SDR”) is equivalent to applying these two rates to the benefits that are projected to be paid during the different time periods. The SDR reflects (1) the long-term expected rate of return on pension plan investments (during the period in which the fiduciary net position is projected to be sufficient to pay benefits) and (2) a tax-exempt municipal bond rate based on an index of 20-year general obligation bonds with an average AA credit rating as of the measurement date (to the extent that the contributions for use with the long-term expected rate of return are not met).

For the purpose of this valuation, the expected rate of return on pension plan investments is 7.25%; the municipal bond rate is 3.31%; and the resulting Single Discount Rate is 7.00%.

The sponsor finances benefits using a funding policy defined in state statutes. Sponsor contributions are equal to a fixed payment schedule for payment years 2016 through 2020 and a level percentage of pay contribution determined so that the Fund attains a 90% funded ratio by the end of 2055 on an open group basis for payment years on and after 2021. The statutory contribution does not explicitly separate projected employer contributions between current plan members and future plan members.

For purposes of developing the Single Discount Rate, we have projected actuarial liabilities on an Entry Age Normal basis, and compared against projected market value of assets. We have assumed the actuarial liability for future members will be fully financed, to the extent that assets are available, and any remaining asset will be assigned to current plan members. Based on this assignment of assets and employer contributions, plan assets assigned to current members are projected to be depleted by 2070.

The tables in this section provide background for the development of the Single Discount Rate.

The following tables show the assignment of assets and employer contributions and the projection of assets for current members as of the actuarial valuation date. Our projections assume the sponsor will make the required statutory contributions. The projections are based on the statutory funding projections performed during the December 31, 2017, actuarial valuation.

Total administrative expenses are assumed to increase at the assumed rate of inflation, or 2.75%. Total administrative expenses are allocated between current and future hires by total payroll.

# Projection of Funded Status and Assignment of Assets

PYE 12/31	Open Group Actuarial Liability	Closed Group Actuarial Liability	Future Member Actuarial Liability	Open Group Assets	Future Member Assigned Assets	Closed Group Assigned Assets	Funded Ratio Current Members	Funded Ratio Future Members
	(a)	(b)	(c)=(a)-(b)	(d)	(e)=min[(c),(d)]	(f)=(d)-(e)	(g)=(f)/(b)	(h)=(e)/(c)
2017	\$13,093,882,568	\$13,093,882,568	\$ -	\$3,122,066,293	\$ -	\$3,122,066,293	23.84%	0.00%
2018	13,488,350,144	13,488,350,144	-	3,205,491,251	-	3,205,491,251	23.76%	0.00%
2019	13,883,984,497	13,878,037,342	5,947,154	3,295,965,985	5,947,154	3,290,018,830	23.71%	100.00%
2020	14,279,414,818	14,260,543,903	18,870,914	3,533,433,103	18,870,914	3,514,562,188	24.65%	100.00%
2021	14,672,984,517	14,633,000,583	39,983,934	3,774,482,900	39,983,934	3,734,498,966	25.52%	100.00%
2022	15,063,059,758	14,992,571,067	70,488,691	4,021,074,419	70,488,691	3,950,585,728	26.35%	100.00%
2023	15,448,012,902	15,336,469,064	111,543,838	4,272,144,227	111,543,838	4,160,600,388	27.13%	100.00%
2024	15,825,741,221	15,661,369,126	164,372,095	4,525,555,197	164,372,095	4,361,183,103	27.85%	100.00%
2025	16,193,333,657	15,962,979,942	230,353,715	4,779,077,241	230,353,715	4,548,723,526	28.50%	100.00%
2026	16,548,233,152	16,237,082,173	311,150,979	5,031,665,336	311,150,979	4,720,514,357	29.07%	100.00%
2027	16,888,319,303	16,479,969,022	408,350,280	5,282,225,362	408,350,280	4,873,875,081	29.57%	100.00%
2028	17,212,661,656	16,688,683,252	523,978,404	5,531,834,793	523,978,404	5,007,856,389	30.01%	100.00%
2029	17,521,708,835	16,862,069,435	659,639,401	5,782,129,120	659,639,401	5,122,489,719	30.38%	100.00%
2030	17,816,322,965	16,999,375,680	816,947,285	6,036,069,006	816,947,285	5,219,121,721	30.70%	100.00%
2031	18,097,483,064	17,099,789,563	997,693,501	6,297,389,642	997,693,501	5,299,696,141	30.99%	100.00%
2032	18,366,284,320	17,162,619,518	1,203,664,803	6,569,674,418	1,203,664,803	5,366,009,615	31.27%	100.00%
2033	18,623,321,462	17,186,179,954	1,437,141,508	6,855,811,738	1,437,141,508	5,418,670,230	31.53%	100.00%
2034	18,869,949,428	17,169,763,835	1,700,185,593	7,159,371,274	1,700,185,593	5,459,185,681	31.80%	100.00%
2035	19,108,063,459	17,114,236,407	1,993,827,052	7,482,510,491	1,993,827,052	5,488,683,439	32.07%	100.00%
2036	19,338,238,791	17,020,262,231	2,317,976,560	7,822,066,057	2,317,976,560	5,504,089,497	32.34%	100.00%
2037	19,561,757,785	16,888,525,259	2,673,232,526	8,178,317,973	2,673,232,526	5,505,085,447	32.60%	100.00%
2038	19,780,073,081	16,719,444,153	3,060,628,927	8,553,319,303	3,060,628,927	5,492,690,376	32.85%	100.00%
2039	19,994,225,906	16,513,123,437	3,481,102,469	8,949,600,331	3,481,102,469	5,468,497,862	33.12%	100.00%
2040	20,205,313,457	16,269,826,335	3,935,487,122	9,370,328,650	3,935,487,122	5,434,841,528	33.40%	100.00%
2041	20,414,932,047	15,990,574,876	4,424,357,171	9,820,024,676	4,424,357,171	5,395,667,504	33.74%	100.00%
2042	20,624,438,495	15,676,832,962	4,947,605,533	10,301,689,326	4,947,605,533	5,354,083,793	34.15%	100.00%
2043	20,834,708,609	15,329,754,782	5,504,953,827	10,818,617,273	5,504,953,827	5,313,663,446	34.66%	100.00%
2044	21,046,473,558	14,950,841,669	6,095,631,889	11,374,288,981	6,095,631,889	5,278,657,092	35.31%	100.00%
2045	21,259,826,743	14,541,238,121	6,718,588,622	11,972,039,483	6,718,588,622	5,253,450,861	36.13%	100.00%
2046	21,475,277,969	14,103,146,641	7,372,131,328	12,615,994,261	7,372,131,328	5,243,862,933	37.18%	100.00%
2047	21,693,201,242	13,639,276,153	8,053,925,088	13,310,022,950	8,053,925,088	5,256,097,862	38.54%	100.00%
2048	21,913,552,620	13,152,550,822	8,761,001,798	14,058,011,580	8,761,001,798	5,297,009,782	40.27%	100.00%
2049	22,135,935,294	12,646,110,108	9,489,825,186	14,863,459,459	9,489,825,186	5,373,634,273	42.49%	100.00%
2050	22,359,869,516	12,123,078,498	10,236,791,018	15,730,072,432	10,236,791,018	5,493,281,414	45.31%	100.00%
2051	22,585,629,142	11,587,359,854	10,998,269,288	16,662,670,417	10,998,269,288	5,664,401,129	48.88%	100.00%
2052	22,813,750,125	11,043,059,554	11,770,690,571	17,666,592,140	11,770,690,571	5,895,901,569	53.39%	100.00%
2053	23,045,039,197	10,494,196,991	12,550,842,206	18,747,805,321	12,550,842,206	6,196,963,114	59.05%	100.00%
2054	23,280,279,206	9,944,436,004	13,335,843,202	19,912,560,387	13,335,843,202	6,576,717,185	66.13%	100.00%
2055	23,520,126,695	9,396,951,402	14,123,175,294	21,167,448,810	14,123,175,294	7,044,273,516	74.96%	100.00%
2056	23,765,315,089	8,854,596,470	14,910,718,619	21,388,783,580	14,910,718,619	6,478,064,962	73.16%	100.00%
2057	24,016,769,554	8,320,079,628	15,696,689,926	21,615,092,598	15,696,689,926	5,918,402,672	71.13%	100.00%
2058	24,275,650,279	7,795,824,782	16,479,825,497	21,848,085,251	16,479,825,497	5,368,259,753	68.86%	100.00%
2059	24,543,249,727	7,284,105,865	17,259,143,861	22,088,924,754	17,259,143,861	4,829,780,893	66.31%	100.00%
2060	24,820,724,148	6,786,740,062	18,033,984,086	22,338,651,733	18,033,984,086	4,304,667,647	63.43%	100.00%
2061	25,109,111,301	6,305,170,280	18,803,941,021	22,598,200,172	18,803,941,021	3,794,259,150	60.18%	100.00%
2062	25,409,341,819	5,840,570,921	19,568,770,897	22,868,407,637	19,568,770,897	3,299,636,740	56.50%	100.00%
2063	25,722,220,276	5,393,925,002	20,328,295,274	23,149,998,248	20,328,295,274	2,821,702,974	52.31%	100.00%
2064	26,048,415,841	4,966,002,435	21,082,413,406	23,443,574,257	21,082,413,406	2,361,160,851	47.55%	100.00%
2065	26,388,312,354	4,557,336,048	21,830,976,306	23,749,481,119	21,830,976,306	1,918,504,813	42.10%	100.00%
2066	26,742,165,656	4,168,296,478	22,573,869,177	24,067,949,091	22,573,869,177	1,494,079,913	35.84%	100.00%
2067	27,109,983,948	3,799,093,527	23,310,890,421	24,398,985,553	23,310,890,421	1,088,095,132	28.64%	100.00%
2068	27,491,606,770	3,449,804,468	24,041,802,302	24,742,446,092	24,041,802,302	700,643,791	20.31%	100.00%
2069	27,886,707,057	3,120,429,444	24,766,277,613	25,098,036,352	24,766,277,613	331,758,739	10.63%	100.00%
2070	28,294,802,293	2,810,881,348	25,483,920,945	25,465,322,063	25,465,322,063	-	0.00%	99.93%
2071	28,715,286,261	2,521,020,494	26,194,265,766	25,843,757,635	25,843,757,635	-	0.00%	98.66%

*The projections in this report are strictly for the purpose of determining the GASB Single Discount Rate and are different from a funding projection for the ongoing plan.*

# Current Member Projection of Assets and Assignment of Employer Contributions

PYE 12/31	Assets (boy)	Member Contributions	Administrative Expenses	Benefit Payments	Assigned Sponsor Contribution	Income on Assets and Cash Flow	Assets (eoy)
2018	\$ 3,122,066,293	\$ 105,838,982	\$ 4,976,195	\$ 767,983,518	\$ 556,314,276	\$ 194,231,412	\$ 3,205,491,251
2019	3,205,491,251	114,183,681	5,001,659	798,539,438	576,388,241	197,496,754	3,290,018,830
2020	3,290,018,830	114,090,471	4,980,800	830,218,375	743,531,350	202,120,712	3,514,562,188
2021	3,514,562,188	113,022,348	4,950,271	862,563,416	760,326,400	214,101,716	3,734,498,966
2022	3,734,498,966	111,550,082	4,896,929	896,308,293	777,259,602	228,482,301	3,950,585,728
2023	3,950,585,728	109,780,827	4,829,441	931,476,038	794,018,873	242,520,439	4,160,600,388
2024	4,160,600,388	107,532,919	4,745,712	967,975,073	809,712,878	256,057,702	4,361,183,103
2025	4,361,183,103	104,958,879	4,644,612	1,006,744,004	825,131,036	268,839,125	4,548,723,526
2026	4,548,723,526	101,745,549	4,521,870	1,046,746,010	840,698,963	280,614,199	4,720,514,357
2027	4,720,514,357	97,966,930	4,380,215	1,087,321,599	855,890,855	291,204,753	4,873,875,081
2028	4,873,875,081	93,830,068	4,222,577	1,127,992,696	871,915,984	300,450,529	5,007,856,389
2029	5,007,856,389	89,392,299	4,050,960	1,167,012,064	887,979,651	308,324,404	5,122,489,719
2030	5,122,489,719	85,001,196	3,869,326	1,204,555,091	905,205,788	314,849,434	5,219,121,721
2031	5,219,121,721	80,509,779	3,680,290	1,240,218,141	923,851,684	320,111,389	5,299,696,141
2032	5,299,696,141	76,150,658	3,488,251	1,274,309,372	943,716,882	324,243,557	5,366,009,615
2033	5,366,009,615	71,385,277	3,289,514	1,306,744,431	963,945,405	327,363,879	5,418,670,230
2034	5,418,670,230	66,382,239	3,076,207	1,336,784,585	984,429,043	329,564,960	5,459,185,681
2035	5,459,185,681	61,490,213	2,856,262	1,363,489,787	1,003,349,857	331,003,737	5,488,683,439
2036	5,488,683,439	56,694,858	2,647,581	1,387,110,622	1,016,683,703	331,785,700	5,504,089,497
2037	5,504,089,497	51,919,235	2,453,718	1,407,532,993	1,027,299,384	331,764,043	5,505,085,447
2038	5,505,085,447	47,231,910	2,266,846	1,425,161,183	1,036,950,416	330,850,632	5,492,690,376
2039	5,492,690,376	42,551,780	2,076,485	1,440,214,239	1,046,470,016	329,076,414	5,468,497,862
2040	5,468,497,862	38,060,508	1,887,878	1,452,911,546	1,056,542,688	326,539,893	5,434,841,528
2041	5,434,841,528	33,699,561	1,699,310	1,462,414,576	1,067,814,939	323,425,362	5,395,667,504
2042	5,395,667,504	29,684,478	1,520,559	1,468,802,442	1,079,043,413	320,011,399	5,354,083,793
2043	5,354,083,793	25,866,711	1,346,142	1,472,197,845	1,090,719,927	316,537,001	5,313,663,446
2044	5,313,663,446	22,351,146	1,181,574	1,472,519,081	1,103,084,641	313,258,513	5,278,657,092
2045	5,278,657,092	19,041,780	1,022,155	1,470,033,449	1,116,340,727	310,466,866	5,253,450,861
2046	5,253,450,861	15,981,005	870,605	1,463,836,796	1,130,628,579	308,509,889	5,243,862,933
2047	5,243,862,933	13,240,584	731,494	1,453,724,886	1,145,634,269	307,816,456	5,256,097,862
2048	5,256,097,862	10,750,591	602,077	1,439,525,425	1,161,442,848	308,845,982	5,297,009,782
2049	5,297,009,782	8,548,364	485,014	1,421,268,703	1,177,735,881	312,093,964	5,373,634,273
2050	5,373,634,273	6,573,668	377,775	1,399,051,751	1,194,432,104	318,070,895	5,493,281,414
2051	5,493,281,414	4,856,294	282,639	1,372,327,370	1,211,544,693	327,328,737	5,664,401,129
2052	5,664,401,129	3,472,429	204,652	1,341,243,366	1,228,998,894	340,477,134	5,895,901,569
2053	5,895,901,569	2,382,517	142,186	1,306,089,203	1,246,758,761	358,151,656	6,196,963,114
2054	6,196,963,114	1,586,792	95,886	1,267,493,311	1,264,760,323	380,996,153	6,576,717,185
2055	6,576,717,185	1,003,380	61,392	1,226,058,664	1,283,023,399	409,649,608	7,044,273,516
2056	7,044,273,516	589,974	36,550	1,182,258,534	1,270,742,734	444,753,822	6,478,064,962
2057	6,478,064,962	306,757	19,259	1,136,373,197	1,250,402,662	426,020,749	5,918,402,672
2058	5,918,402,672	119,669	7,615	1,088,821,677	1,231,055,742	387,510,963	5,368,259,753
2059	5,368,259,753	28,949	1,867	1,039,912,254	1,212,053,939	349,352,372	4,829,780,893
2060	4,829,780,893	1,010	66	990,197,952	1,193,019,997	312,063,766	4,304,667,647
2061	4,304,667,647	-	-	940,125,165	1,173,958,237	275,758,431	3,794,259,150
2062	3,794,259,150	-	-	890,025,278	1,154,882,162	240,520,706	3,299,636,740
2063	3,299,636,740	-	-	840,164,225	1,135,811,228	206,419,232	2,821,702,974
2064	2,821,702,974	-	-	790,816,596	1,116,765,170	173,509,303	2,361,160,851
2065	2,361,160,851	-	-	742,265,224	1,097,777,739	141,831,447	1,918,504,813
2066	1,918,504,813	-	-	694,704,021	1,080,865,146	111,413,975	1,494,079,913
2067	1,494,079,913	-	-	648,314,243	1,061,696,100	85,230,590	1,088,095,132
2068	1,088,095,132	-	-	603,238,542	1,042,938,096	57,402,099	700,643,791
2069	700,643,791	-	-	559,556,807	1,024,308,313	30,867,635	331,758,740
2070	331,758,740	-	-	517,353,301	1,005,778,722	5,626,578	-
2071	-	-	-	476,672,691	984,672,691	(16,977,060)	-

*The projections in this report are strictly for the purpose of determining the GASB Single Discount Rate and are different from a funding projection for the ongoing plan.*

# Development of Single Discount Rate

PYE 12/31	Benefit Payments	Discount Rate	Discounted Benefit Payment	Single Discount Rate	Discounted Benefit Payment
2018	\$ 767,983,518	7.25%	\$ 741,571,873	7.00%	\$ 742,447,856
2019	798,539,438	7.25%	718,952,865	7.00%	721,503,669
2020	830,218,375	7.25%	696,945,934	7.00%	701,072,015
2021	862,563,416	7.25%	675,150,326	7.00%	680,752,808
2022	896,308,293	7.25%	654,138,274	7.00%	661,125,544
2023	931,476,038	7.25%	633,850,055	7.00%	642,134,977
2024	967,975,073	7.25%	614,160,270	7.00%	623,658,619
2025	1,006,744,004	7.25%	595,578,889	7.00%	606,219,530
2026	1,046,746,010	7.25%	577,383,351	7.00%	589,088,170
2027	1,087,321,599	7.25%	559,221,239	7.00%	571,906,614
2028	1,127,992,696	7.25%	540,921,979	7.00%	554,499,945
2029	1,167,012,064	7.25%	521,802,777	7.00%	536,165,273
2030	1,204,555,091	7.25%	502,181,150	7.00%	517,223,346
2031	1,240,218,141	7.25%	482,097,099	7.00%	497,711,469
2032	1,274,309,372	7.25%	461,863,896	7.00%	477,950,106
2033	1,306,744,431	7.25%	441,603,488	7.00%	458,064,314
2034	1,336,784,585	7.25%	421,217,072	7.00%	437,950,822
2035	1,363,489,787	7.25%	400,589,097	7.00%	417,487,929
2036	1,387,110,622	7.25%	379,980,257	7.00%	396,945,833
2037	1,407,532,993	7.25%	359,510,200	7.00%	376,449,608
2038	1,425,161,183	7.25%	339,405,845	7.00%	356,238,101
2039	1,440,214,239	7.25%	319,804,914	7.00%	336,458,573
2040	1,452,911,546	7.25%	300,815,289	7.00%	317,228,202
2041	1,462,414,576	7.25%	282,314,989	7.00%	298,422,275
2042	1,468,802,442	7.25%	264,380,558	7.00%	280,125,234
2043	1,472,197,845	7.25%	247,078,528	7.00%	262,411,667
2044	1,472,519,081	7.25%	230,426,519	7.00%	245,304,779
2045	1,470,033,449	7.25%	214,487,231	7.00%	228,876,083
2046	1,463,836,796	7.25%	199,145,082	7.00%	213,007,047
2047	1,453,724,886	7.25%	184,400,396	7.00%	197,702,269
2048	1,439,525,425	7.25%	170,255,701	7.00%	182,968,734
2049	1,421,268,703	7.25%	156,733,278	7.00%	168,834,755
2050	1,399,051,751	7.25%	143,853,854	7.00%	155,327,215
2051	1,372,327,370	7.25%	131,567,356	7.00%	142,396,599
2052	1,341,243,366	7.25%	119,894,899	7.00%	130,070,136
2053	1,306,089,203	7.25%	108,860,082	7.00%	118,377,991
2054	1,267,493,311	7.25%	98,501,806	7.00%	107,367,272
2055	1,226,058,664	7.25%	88,840,802	7.00%	97,065,659
2056	1,182,258,534	7.25%	79,876,012	7.00%	87,477,212
2057	1,136,373,197	7.25%	71,585,918	7.00%	78,583,537
2058	1,088,821,677	7.25%	63,953,759	7.00%	70,371,282
2059	1,039,912,254	7.25%	56,951,965	7.00%	62,815,022
2060	990,197,952	7.25%	50,563,455	7.00%	55,900,663
2061	940,125,165	7.25%	44,761,341	7.00%	49,603,090
2062	890,025,278	7.25%	39,511,403	7.00%	43,888,780
2063	840,164,225	7.25%	34,776,590	7.00%	38,720,724
2064	790,816,596	7.25%	30,521,178	7.00%	34,063,022
2065	742,265,224	7.25%	26,710,826	7.00%	29,880,966
2066	694,704,021	7.25%	23,309,380	7.00%	26,137,464
2067	648,314,243	7.25%	20,282,392	7.00%	22,796,980
2068	603,238,542	7.25%	17,596,463	7.00%	19,824,806
2069	559,556,807	7.25%	15,218,897	7.00%	17,186,687
2070	517,353,301	7.25%	13,119,852	7.00%	14,851,261
2071	476,672,691	3.31%	83,484,131	7.00%	12,788,644
2081	164,114,293	3.31%	20,754,221	7.00%	2,238,885
2091	25,793,755	3.31%	2,355,326	7.00%	178,929
2101	911,637	3.31%	60,108	7.00%	3,216
2111	3,687	3.31%	176	7.00%	7
2116	104	3.31%	4	7.00%	0
<b>Total Present Value</b>			<b>\$ 15,779,573,952</b>		<b>\$ 15,779,573,952</b>

*The projections in this report are strictly for the purpose of determining the GASB Single Discount Rate and are different from a funding projection for the ongoing plan.*



## **SECTION H**

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### **GLOSSARY OF TERMS**

## Glossary of Terms

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<b><i>Accrued Service</i></b>	Service credited under the system which was rendered before the date of the actuarial valuation.
<b><i>Actuarial Accrued Liability ("AAL")</i></b>	The AAL is the difference between the actuarial present value of all benefits and the actuarial value of future normal costs. The definition comes from the fundamental equation of funding which states that the present value of all benefits is the sum of the Actuarial Accrued Liability and the present value of future normal costs. The AAL may also be referred to as "accrued liability" or "actuarial liability."
<b><i>Actuarial Assumptions</i></b>	These assumptions are estimates of future experience with respect to rates of mortality, disability, turnover, retirement, rate or rates of investment income and compensation increases. Actuarial assumptions are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (compensation increases, payroll growth, inflation and investment return) consist of an underlying real rate of return plus an assumption for a long-term average rate of inflation.
<b><i>Actuarial Cost Method</i></b>	A mathematical budgeting procedure for allocating the dollar amount of the actuarial present value of the pension trust benefits between future normal cost and actuarial accrued liability. The actuarial cost method may also be referred to as the actuarial funding method.
<b><i>Actuarial Equivalent</i></b>	A single amount or series of amounts of equal actuarial value to another single amount or series of amounts, computed on the basis of appropriate actuarial assumptions.
<b><i>Actuarial Gain (Loss)</i></b>	The difference in liabilities between actual experience and expected experience during the period between two actuarial valuations is the gain (loss) on the accrued liabilities.
<b><i>Actuarial Present Value ("APV")</i></b>	The amount of funds currently required to provide a payment or series of payments in the future. The present value is determined by discounting future payments at predetermined rates of interest and probabilities of payment.
<b><i>Actuarial Valuation</i></b>	The actuarial valuation report determines, as of the actuarial valuation date, the service cost, total pension liability and related actuarial present value of projected benefit payments for pensions.
<b><i>Actuarial Valuation Date</i></b>	The date as of which an actuarial valuation is performed.
<b><i>Actuarially Determined Contribution ("ADC") or Annual Required Contribution ("ARC")</i></b>	A calculated contribution into a defined benefit pension plan for the reporting period, most often determined based on the funding policy of the plan. Typically the Actuarially Determined Contribution has a normal cost payment and an amortization payment.

## Glossary of Terms

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<b><i>Amortization Method</i></b>	The method used to determine the periodic amortization payment may be a level dollar amount, or a level percent of pay amount. The period will typically be expressed in years, and the method will either be “open” (meaning, reset each year) or “closed” (the number of years remaining will decline each year).
<b><i>Amortization Payment</i></b>	The amortization payment is the periodic payment required to pay off an interest-discounted amount with payments of interest and principal.
<b><i>Cost-of-Living Adjustments</i></b>	Postemployment benefit changes intended to adjust benefit payments for the effects of inflation.
<b><i>Cost-Sharing Multiple-Employer Defined Benefit Pension Plan (cost-sharing pension plan)</i></b>	A multiple-employer defined benefit pension plan in which the pension obligations to the employees of more than one employer are pooled and pension plan assets can be used to pay the benefits of the employees of any employer that provides pensions through the pension plan.
<b><i>Covered-Employee Payroll</i></b>	The payroll of employees that are provided with pensions through the pension plan.
<b><i>Deferred Inflows and Outflows</i></b>	The deferred inflows and outflows of pension resources are amounts used under GASB Statement No. 68 in developing the annual pension expense. Deferred inflows and outflows arise with differences between expected and actual experiences; changes of assumptions. The portion of these amounts not included in pension expense should be included in the deferred inflows or outflows of resources.
<b><i>Deferred Retirement Option Program (“DROP”)</i></b>	A program that permits a plan member to elect a calculation of benefit payments based on service credits and salary, as applicable, as of the DROP entry date. The plan member continues to provide service to the employer and is paid for the service by the employer after the DROP entry date; however, the pensions that would have been paid to the plan member are credited to an individual member account within the defined benefit pension plan until the end of the DROP period. Other variations for DROP exist and will be more fully detailed in the plan provision section of the valuation report.
<b><i>Discount Rate</i></b>	For GASB purposes, the discount rate is the single rate of return that results in the present value of all projected benefit payments to be equal to the sum of the funded and unfunded projected benefit payments, specifically: <ol style="list-style-type: none"><li>1. The benefit payments to be made while the pension plans’ fiduciary net position is projected to be greater than the benefit payments that are projected to be made in the period; and</li><li>2. The present value of the benefit payments not in (1) above, discounted using the municipal bond rate.</li></ol>

## Glossary of Terms

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<b><i>Entry Age Actuarial Cost Method (“EAN”)</i></b>	The EAN is a cost method for allocating the costs of the plan between the normal cost and the accrued liability. The actuarial present value of the projected benefits of each individual included in an actuarial valuation is allocated on a level basis (either level dollar or level percent of pay) over the earnings or service of the individual between entry age and assumed exit ages(s). The portion of the actuarial present value allocated to a valuation year is the normal cost. The portion of this actuarial present value not provided for at a valuation date by the actuarial present value of future normal costs is the actuarial accrued liability. The sum of the accrued liability plus the present value of all future normal costs is the present value of all benefits.
<b><i>Fiduciary Net Position</i></b>	The fiduciary net position is the market value of the assets of the trust dedicated to the defined benefit provisions.
<b><i>GASB</i></b>	The Governmental Accounting Standards Board is an organization that exists in order to promulgate accounting standards for governmental entities.
<b><i>Long-Term Expected Rate of Return</i></b>	The long-term rate of return is the expected return to be earned over the entire trust portfolio based on the asset allocation of the portfolio.
<b><i>Money-Weighted Rate of Return</i></b>	The money-weighted rate of return is a method of calculating the returns that adjusts for the changing amounts actually invested. For purposes of GASB Statement No. 67, money-weighted rate of return is calculated as the internal rate of return on pension plan investments, net of pension plan investment expense.
<b><i>Multiple-Employer Defined Benefit Pension Plan</i></b>	A multiple-employer plan is a defined benefit pension plan that is used to provide pensions to the employees of more than one employer.
<b><i>Municipal Bond Rate</i></b>	The Municipal Bond Rate is the discount rate to be used for those benefit payments that occur after the assets of the trust have been depleted.
<b><i>Net Pension Liability (“NPL”)</i></b>	The NPL is the liability of employers and non-employer contributing entities to plan members for benefits provided through a defined benefit pension plan.
<b><i>Non-Employer Contributing Entities</i></b>	Non-employer contributing entities are entities that make contributions to a pension plan that is used to provide pensions to the employees of other entities. For purposes of the GASB accounting statements, plan members are not considered non-employer contributing entities.
<b><i>Normal Cost</i></b>	The portion of the actuarial present value allocated to a valuation year is called the normal cost. For purposes of application to the requirements of this Statement, the term normal cost is the equivalent of service cost.

## Glossary of Terms

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<b><i>Other Postemployment Benefits (“OPEB”)</i></b>	All postemployment benefits other than retirement income (such as death benefits, life insurance, disability and long-term care) that are provided separately from a pension plan, as well as postemployment healthcare benefits regardless of the manner in which they are provided. Other postemployment benefits do not include termination benefits.
<b><i>Real Rate of Return</i></b>	The real rate of return is the rate of return on an investment after adjustment to eliminate inflation.
<b><i>Service Cost</i></b>	The service cost is the portion of the actuarial present value of projected benefit payments that is attributed to a valuation year.
<b><i>Total Pension Expense</i></b>	The total pension expense is the sum of the following items that are recognized at the end of the employer’s fiscal year: <ol style="list-style-type: none"><li>1. Service Cost</li><li>2. Interest on the Total Pension Liability</li><li>3. Current-Period Benefit Changes</li><li>4. Employee Contributions (made negative for addition here)</li><li>5. Projected Earnings on Plan Investments (made negative for addition here)</li><li>6. Pension Plan Administrative Expense</li><li>7. Other Changes in Plan Fiduciary Net Position</li><li>8. Recognition of Outflow (Inflow) of Resources due to Liabilities</li><li>9. Recognition of Outflow (Inflow) of Resources due to Assets</li></ol>
<b><i>Total Pension Liability (“TPL”)</i></b>	The TPL is the portion of the actuarial present value of projected benefit payments that is attributed to past periods of member service.
<b><i>Unfunded Actuarial Accrued Liability (“UAAL”)</i></b>	The UAAL is the difference between actuarial accrued liability and valuation assets.
<b><i>Valuation Assets</i></b>	The valuation assets are the assets used in determining the unfunded liability of the plan. For purposes of GASB Statement Nos. 67 and 68, the valuation assets are equal to the market value of assets.