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GASB STATEMENT NO. 67 REPORT

FOR THE

RETIREMENT SYSTEM FOR EMPLOYEES

OF THE CITY OF CINCINNATI

PREPARED AS OF JUNE 30, 2018

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October 9, 2018

Board of Trustees
Retirement System for Employees of the City of Cincinnati
801 Plum Street, Suite 328
Cincinnati, OH 45202

Dear Members of the Board:

Presented in this report is information to assist the Retirement System for Employees of the City of Cincinnati (System), in meeting the requirements of the Governmental Accounting Standards Board (GASB) Statements No. 67. This report has been prepared as of June 30, 2018 (the Measurement Date) to assist the System in better understanding the requirements of GASB 67 and to identify the information to be provided by the System's actuary, Cavanaugh Macdonald Consulting (CMC).

The annual actuarial valuation used as a basis for much of the information presented in this report was performed as of December 31, 2017. The valuation was based upon data, furnished by the System, concerning active, inactive, and retired members along with pertinent financial information.

The actuarial calculations were performed by qualified actuaries according to generally accepted actuarial procedures and methods. The calculations are based on the current provisions of the System, and on actuarial assumptions that are, individually and in the aggregate, internally consistent and reasonably based on the actual experience of the System. In addition, the calculations were completed in compliance with the laws governing the System and, in our opinion, meet the requirements of GASB 67. The undersigned are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

These results are only for financial reporting and may not be appropriate for funding purposes or other types of analysis. Calculations for purposes other than satisfying the requirements of GASB 67 may produce significantly different results. Future actuarial results may differ significantly from the current results presented in this report due to such factors as changes in plan experience or changes in economic or demographic assumptions.

Respectfully submitted,

Edward J. Koebel

Ben Mobley

Edward J. Koebel, EA, FCA, MAAA	Ben D. Mobley, ASA, FCA, MAAA
Principal and Consulting Actuary	Senior Actuary

EJK/BDM

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REPORT OF THE ANNUAL GASB STATEMENT NO. 67
REQUIRED INFORMATION FOR THE
RETIREMENT SYSTEM FOR THE EMPLOYEES
OF THE CITY OF CINCINNATI

PREPARED AS OF JUNE 30, 2018

SECTION I – INTRODUCTION

The Governmental Accounting Standards Board issued Statement No. 67 (GASB 67), *"Financial Reporting for Pension Plans"*, in June 2012. This report has been prepared as of June 30, 2018. Much of the material provided in this report is based on the data, assumptions and results of the annual actuarial valuation of the System as of December 31, 2017. The results of that valuation were detailed in a report dated June 7, 2018.

GASB 67 requires a measurement of the Total Pension Liability (TPL) utilizing the Entry Age Normal actuarial funding method. If the valuation date at which the TPL is determined is before the measurement date, as is the case here, the TPL must be rolled forward to the measurement date. The Net Pension Liability (NPL) is then set equal to the rolled forward TPL minus the System's Fiduciary Net Position (FNP) (basically the market values of assets) as of the measurement date. The benefit provisions recognized in the calculation of the TPL are summarized in Schedule B. The development of the roll-forward of the TPL is shown in the table on page 7.

Among the assumptions needed for the liability calculation is a Single Equivalent Interest Rate (SEIR). To determine the SEIR, the FNP must be projected into the future for as long as there are anticipated benefits payable under the plan's provision applicable to the members and beneficiaries of the System on the Measurement Date. Future contributions were projected to be made in accordance with the City Ordinance as of the Measurement Date adopted by the City Council and Mayor. If the FNP is not projected to be depleted at any point in the future, the long term expected rate of return on plan investments expected to be used to finance the benefit payments may be used as the SEIR.

If, however, at a future measurement date, the FNP is projected to be depleted, the SEIR is determined as the single rate that will generate a present value of benefit payments equal to the sum of the present value determined by discounting all projected benefit payments through the date of depletion by the long term expected rate of return, and the present value determined by discounting those benefits after the date of depletion by a 20-year tax-exempt municipal bond (rating AA/Aa or higher) rate. The rate used, if necessary, for this purpose is the June average of the Bond Buyer General Obligation 20-year Municipal Bond Index published weekly by the Board of Governors of the Federal Reserve System. We have determined that the FNP is projected to not be depleted during the projection period and a discount rate of 7.50% as of June 30, 2018 will meet the requirements of GASB 67.

The sections that follow provide the results of all the necessary calculations, presented in the order laid out in GASB 67 for note disclosure and Required Supplementary Information (RSI).

SECTION II – FINANCIAL STATEMENT NOTES

The actuarial related information presented herein will follow the order presented in GASB 67. There are other non-actuarial items required which are not included in this report. Paragraph numbers are provided for ease of reference.

Paragraph 30.a. (4): The data required regarding the membership of the Retirement System for Employees of the City of Cincinnati were furnished by the System. The following table summarizes the membership of the System as of December 31, 2017, the Valuation Date.

Membership

	Number
Retired participants and beneficiaries currently receiving benefits*	4,233
Terminated participants and beneficiaries entitled to benefits but not yet receiving benefits	211
Inactive participants**	8,472
Active participants	
Full-Time	3,029
Part-Time	742
Total	16,687

* Includes 108 members participating in the Deferred Retirement Option Plan (DROP) as of December 31, 2017.

**Participants who are former employees who have an employee account balance in the plan but are not otherwise vested in an employer provided benefit.

Paragraph 31.a. (1)-(4): As stated earlier, the NPL is equal to the TPL minus the FNP. That result as of June 30, 2018 is presented in the following table ($ thousands).

	Fiscal Year Ending June 30, 2018
Total Pension Liability	$ 2,359,689
Fiduciary Net Position	1,762,196
Net Pension Liability	$ 597,493
Ratio of Fiduciary Net Position to Total Pension Liability	74.68%

Paragraph 31.b.: This paragraph requires information regarding the actuarial assumptions used to measure the TPL. The set of actuarial assumptions utilized in developing the TPL are outlined in Appendix C. The total pension liability was determined based on an actuarial valuation as of December 31, 2017, using the following actuarial assumptions, applied to all periods included in the measurement and rolled forward to the measurement date of June 30, 2018:

Inflation	2.75 percent
Salary increases	3.75 to 7.50 percent, including inflation
Investment rate of return	7.50 percent, net of pension plan investment expense, and including inflation
Mortality	Pre-retirement mortality rates were based on the RP-2014 Employees Mortality Table with a generational approach using the MP-2017 projection scale. Post-retirement mortality rates were based on the RP-2014 Mortality Table with a generational approach using the MP-2017 projection scale and set forward two years for both males and females. Post-disability mortality rates were based on the RP-2014 Disabled Retiree Mortality Table with a generational approach using the MP-2017 projection scale.

The actuarial assumptions used in the December 31, 2017 valuation were based on the results of the last actuarial experience study, dated February 28, 2018.

Paragraph 31.b.(1)

(a) **Discount rate**. The discount rate used to measure the total pension liability was 7.50% as of June 30, 2017 and as of June 30, 2018.

(b) **Projected cash flows:** The projection of cash flows used to determine the discount rate assumed that plan member contributions of 9.0% and Employer contributions of 16.25% will be made as set out in City Council ordinance.

(c) **Long term rate of return:** The long-term expected rate of return on pension plan investments was determined using a log-normal distribution analysis in which best-estimate ranges of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class. These ranges are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and by adding expected inflation.

(d) **Municipal bond rate:** The municipal bond rate was not needed as of June 30, 2018 as the FNP is projected to not be depleted during the projection period.

(e) **Periods of projected benefit payments:** Projected future benefit payments for all current plan members were projected through 2117.

(f) **Assumed asset allocation**: The target asset allocation and best estimates of arithmetic real rates of return for each major asset class are summarized in the following table:

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return*
Core Bonds	14.00%	2.80%
High Yield Bonds	3.00%	4.90%
Large-Cap Value Equity	7.00%	7.20%
Large-Cap Growth Equity	5.00%	7.10%
Mid-Cap Value Equity	4.00%	7.50%
Mid-Cap Core Equity	4.00%	7.50%
Small-Cap Value Equity	7.50%	8.00%
Non-U.S. Developed Large Cap	10.00%	7.40%
Non-U.S. Small Cap	5.00%	8.10%
Emerging Markets All-Cap	5.00%	8.50%
EM Small-Cap	3.00%	8.50%
Real Estate Core Equity	10.00%	7.40%
Infrastructure	7.50%	7.80%
Risk Parity	5.00%	4.10%
Private Equity	10.00%	11.10%
Total	100.00%	

*Geometric mean

(g): **Sensitivity analysis**: Disclosure of the sensitivity of the net pension liability to changes in the discount rate. The following presents the net pension liability of the System, calculated using the discount rate of 7.50 percent, as well as what the System's net pension liability calculated using a discount rate that is 1-percentage-point lower (6.50 percent) or 1-percentage-point higher (8.50 percent) than the current rate:

	1% Decrease (6.50%)	Current Discount Rate (7.50%)	1% Increase (8.50%)
System's Net Pension Liability	$842,596	$597,493	$389,402

Paragraph 31.c.: The date of the actuarial valuation upon which the TPL is based is December 31, 2017. The TPL as of June 30, 2018 is determined using standard roll forward techniques. The roll forward calculation adds the normal cost for the first half of 2018 (also called the service cost), subtracts the actual benefit payments and refunds for the six months, and then applies the expected SEIR for the period. This procedure was used to determine the TPL as of June 30, 2018, as shown in the following table. In addition, an expected TPL as of June 30, 2018 is determined by rolling forward the June 30, 2017 TPL using similar techniques. The difference between this expected TPL and the actual TPL as of June 30, 2018 is the experience gain or loss for the period. The impact of the assumption changes adopted by the Board on March 1, 2018 are shown as an assumption change loss.

TPL Roll-Forward ($ thousands)		**New Assumptions**
	(1)	**(2)**
(a) Interest Rate (SEIR)	7.50%	7.50%
(b) TPL as of December 31, 2017	$2,298,598	$2,346,906
(c) Entry Age Normal Cost for the period January 1, 2018 – June 30, 2018	11,838	12,143
(d) Actual Benefit Payments and Refunds for the period January 1, 2018 – June 30, 2018	$84,241	$84,241
(e) TPL as of June 30, 2018 $= [(b) \times (1 + (a))^{1/2}] + (c) - [(d) \times (1 + (a))^{1/4}]$	$2,309,297	$2,359,689
(f) June 30, 2017 TPL Rolled Forward to June 30, 2018	2,279,408	
(g) Experience (Gain)/Loss: (1e) – (1f)	$29,889	
(h) Assumption (Gain)/Loss: (2e) – (1e)		$50,392

SECTION III – REQUIRED SUPPLEMENTARY INFORMATION

There are several tables of Required Supplementary Information (RSI) that need to be included in the System's financial statements:

Paragraphs 32.a.-c.: The required tables of schedules are provided in Appendix A.

Paragraph 34: The following information should be noted regarding the RSI:

Changes of benefit terms:

- 2017
    - There were several changes in benefit provisions as a result of Ordinance 336-2016 adopted by the City Council on October 26, 2016. In addition to incorporating many of the changes mandated by the Collaborative Settlement Agreement (CSA), the Ordinance also:
        - Established benefit and eligibility provisions for Group E and F members not covered under the CSA similar to employees who are covered under the CSA.
        - Established a universal Cost-of-Living Adjustment (COLA) suspension period for all members.
        - Established a universal 3% simple COLA rate for all members.
- 2016
    - There were several changes in benefit provisions as a result of the Collaborative Settlement Agreement (CSA) between the City and various plaintiff groups representing certain active and retired members of CRS as approved by the Court on October 5, 2015 and generally effective January 1, 2016.

Changes in actuarial assumptions and methods:

- 2018
    - The price inflation assumption was decreased from 3.00% to 2.75%.
    - Retirement, withdrawal, and disability rates were changed to more closely reflect recent experience.
    - Mortality rates for all members were changed to a generational approach using the RP-2014 mortality tables.
    - Merit salary scale was changed to more closely reflect recent experience.

- Assumed administrative expense as a percentage of payroll added to the total normal cost was increased from 0.75% to 0.80%.
- The assumed proportion of deferred vested members who will elect to receive a deferred benefit and who will elect to withdraw their contributions was changed to more closely reflect recent experience.
- The assumed percentage of members who are married for the purposes of valuing pre-retirement survivor benefits was changed.

Method and assumptions used in calculations of actuarially determined contributions.

The actuarially determined contribution rates in the schedule of employer contributions are calculated as of the December 31, eighteen months prior to the fiscal year end in which contributions are reported (December 31, 2016 valuation for the June 30, 2018 fiscal year end). The following actuarial methods and assumptions were used to determine actuarial contribution rates reported in that schedule:

Actuarial cost method	Entry age
Amortization method	Level dollar, open
Remaining amortization period	30 years
Asset valuation method	5-year smoothed market
Inflation	3.00 percent
Salary increase	4.00 to 7.50 percent, including inflation
Investment rate of return	7.50 percent, net of pension plan investment expense, and including inflation

APPENDIX A

REQUIRED SUPPLEMENTARY INFORMATION

(EXHIBIT A AND B FOLLOW)

Exhibit A

GASB 67 Paragraph 32.a.
SCHEDULE OF CHANGES IN THE NET PENSION LIABILITY
($ in Thousands)

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Total pension liability											
Service Cost	$ 25,937	$ 27,785	$ 31,764	$ 20,576	$ 22,834						
Interest	148,408	149,052	143,383	159,912	163,313						
Benefit changes	0	0	(76,301)	29,208	0						
Difference between expected and actual experience	0	(14,024)	4,137	3,545	29,889						
Changes of assumptions	(17,827)	155,948	(627,693)	0	50,392						
Benefit payments	(156,149)	(159,176)	(162,103)	(165,986)	(166,645)						
Refunds of contributions	(1,785)	(2,231)	(1,828)	(1,334)	(1,837)						
Net change in total pension liability	(1,416)	157,354	(688,641)	45,921	97,946						
Total pension liability - beginning	2,748,525	2,747,109	2,904,463	2,215,822	2,261,743						
Total pension liability - ending (a)	$ 2,747,109	$ 2,904,463	$ 2,215,822	$ 2,261,743	$ 2,359,689						
Plan net position											
Contributions - employer	$ 37,739	$ 29,084	$ 67,939	$ 30,868	$ 32,586						
Contributions - member	15,059	16,186	16,337	17,740	18,873						
Net investment income	258,382	49,138	(11,631)	209,299	140,314						
Benefit payments	(156,149)	(159,176)	(162,103)	(165,986)	(166,645)						
Administrative expense	(1,383)	(1,570)	(5,418)	(1,572)	(1,485)						
Refunds of contributions	(1,785)	(2,231)	(1,828)	(1,334)	(1,837)						
Other	0	0	237,897	0	0						
Net change in plan net position	151,863	(68,569)	141,193	89,015	21,806						
Plan net position - beginning	1,426,888	1,578,751	1,510,182	1,651,375	1,740,390						
Plan net position - ending (b)	$ 1,578,751	$ 1,510,182	$ 1,651,375	$ 1,740,390	$ 1,762,196						
Net pension liability - ending (a) - (b)	$ 1,168,358	$ 1,394,281	$ 564,447	$ 521,353	$ 597,493						

Exhibit A (Continued)

GASB 67 Paragraph 32.b.
SCHEDULE OF THE NET PENSION LIABILITY
($ in Thousands)

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Total pension liability	$2,747,109	$2,904,463	$2,215,822	$2,261,743	$2,359,689						
Plan net position	1,578,751	1,510,182	1,651,375	1,740,390	1,762,196						
Net pension liability	$1,168,358	$1,394,281	$ 564,447	$ 521,353	$ 597,493						
Ratio of plan net position to total pension liability	57.47%	52.00%	74.53%	76.95%	74.68%						
Covered-employee payroll	$ 163,477	$ 164,575	$ 174,963	$ 196,445	$ 208,317						
Net pension liability as a percentage of covered payroll	714.69%	847.20%	322.61%	265.39%	286.82%						

Exhibit B

GASB 67 Paragraph 32.c.
SCHEDULE OF EMPLOYER CONTRIBUTIONS
($ in Thousands)

	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Actuarially determined employer contribution	$ 48,046	$ 46,689	$ 69,939	$ 75,566	$ 78,101	$ 66,999	$ 49,952	$ 54,875	$ 80,882	$ 43,065
Actual employer contributions	32,586	30,868	67,939	29,084	37,739	37,192	33,608	31,160	30,029	26,650
Annual contribution deficiency (excess)	$ 15,460	$ 15,821	$ 2,000	$ 46,482	$ 40,362	$ 29,807	$ 16,344	$ 23,715	$ 50,853	$ 16,415
Covered-employee payroll	$ 208,317	$ 196,445	$ 174,963	$ 164,575	$ 163,477	$ 167,148	$ 167,148	$ 165,029	$ 167,589	$ 170,416
Actual contributions as a percentage of covered-employee payroll	15.64%	15.71%	38.83%	17.67%	23.09%	22.25%	20.11%	18.88%	17.92%	15.64%

Notes:

Fiscal year changed in 2013 from December 31 to June 30.

Actual employer contribution in 2016 included one-time amount to pay off remaining liability of the 2007 Early Retirement Incentive Program (ERIP).

APPENDIX B

SUMMARY OF BENEFIT PROVISIONS VALUED

Membership

All employees of the City shall be members of the System except for the following:

- Members of the Police and Fireman's Disability and Pension Fund of Ohio.
- Elected City officials.
- Employees for whom the City contributes to PERS.
- Members of the faculties, teaching staffs, research staffs, and administrative staff of the University of Cincinnati appointed to positions covered by the Teachers Insurance and Annuity Association Social Security Plan.
- Persons becoming employees after June 1, 1961, who are employed in any of the following employment classifications: bricklayer, carpenter, carpenter foreman, cement finisher, electrician, electrician foreman, painter, painter foreman, plasterer, plumber, sign painter, steamfitter and pipefitter, tinsmith, or composition roofer.
- Persons hired as police recruits who are not currently enrolled as a member of the System prior to their date of hire.
- Current contributing members of the School Employees Retirement System (SERS) or the State Teachers Retirement System (STRS) who are hired by the City on a seasonal, temporary, or part-time basis.

Members of the System are divided into the following groups:

Group	Criteria
A, B	Any member who has retired prior to 7/1/2011.
C	Any member who, as of June 30, 2011, was an active or deferred vested member and had either: a) Completed at least 30 years of service, or b) Reached age 60 and completed at least 5 years of service.

Group	Criteria
D	Any active member who, between July 1, 2011 and December 31, 2013: 1) Either a) Completed at least 30 years of service, or b) Reached age 60 and completed at least 5 years of service; and 2) Retired prior to January 1, 2014.
E	Any active member who: 1) Between July 1, 2011 and December 31, 2013 either: a) Completed at least 30 years of service, or b) Reached age 60 and completed at least 5 years of service; and 2) Retires on or after January 1, 2014.
F	Any active member whose most recent membership enrollment date was prior to January 1, 2010 and who is not in groups A through E. Any deferred vested member whose most recent membership enrollment date was prior to January 1, 2010, is not in groups A through E, and has at least five years of service prior to the date they separate from employment.
G	Any member whose most recent membership enrollment date is on or after January 1, 2010, or Any member rehired on or after January 1, 2010, who has fewer than 5 years of service as of June 30, 2011, or Any retiree of the System who is receiving a service retirement allowance and is re-employed on or after April 1, 2013.

Members in the System are further classified as follows:

Class	Criteria
CSA Retiree (CSA participants corresponding to Retirees Class)	Group A and B members and their designated optionees.
CSA Employee (CSA participants corresponding to Current Employees Class)	Group C, D, E, and F members (and their designated optionees) that were vested and employed on 7/1/2011.
CMC Employee (Non-CSA participants)	Group E and F members (and their designated optionees) that were either vested or employed on 7/1/2011 and no break in employment service since 1/1/2010 and prior to becoming vested.
Non-CSA	Group G members and their designated optionees.

Service Retirement Benefit

<u>Groups A, B, C and D:</u>

Normal Retirement Eligibility	Age 60 with 5 years of service or 30 years of service.
Early Retirement Eligibility	Age 55 with 25 years of service.
Benefit Formula Multiplier	Members hired prior to July 12, 1998 were given a one-time irrevocable option to choose either the benefit formula using a 2.22% multiplier or the benefit formula using a 2.50% multiplier. For members hired on or after July 12, 1998, benefits are calculated using a 2.50% multiplier.

Average Highest Compensation	Average of the highest three consecutive years of compensation.
Years of Service	Years or fractional years of full-time service rendered to the plan sponsor.
Benefit	a) An annuity which is actuarially equivalent to the accumulated contributions of the member at the time of retirement. b) A pension which together with the annuity produces a total annual retirement allowance equal to the product of the applicable benefit formula multiplier, the member's average highest compensation, and the number of years of service. Early Retirement Benefit is actuarially reduced from normal retirement age.

<u>Group E:</u>

Normal Retirement Eligibility	Age 60 with 5 years of service or 30 years of service.
Early Retirement Eligibility	Age 55 with 25 years of service.

Retirement benefit is composed of as many as three components:

<u>Part A Benefit:</u> for service earned through December 31, 2013

<u>Part B Benefit:</u> for service earned on and after January 1, 2014 up to a combined (Part A and B) 20 years of service

<u>Part C Benefit</u>: for service earned on or after January 1, 2014 in excess of a combined (Part A and B) 20 years of service.

Benefit Formula Multiplier	**<u>Part A Benefit:</u>** Members hired prior to July 12, 1998 were given a one-time irrevocable option to choose either the benefit formula using a 2.22% multiplier or the benefit formula using a 2.50% multiplier. For members hired on or after July 12, 1998, benefits are calculated using a 2.50% multiplier. **<u>Part B Benefit:</u>** Members hired prior to July 12, 1998 were given a one-time irrevocable option to choose either

the benefit formula using a 2.22% multiplier or the benefit formula using a 2.50% multiplier. For members hired on or after July 12, 1998, benefits are calculated using a 2.50% multiplier.

Part C Benefit: 2.20% multiplier

Average Highest Compensation	**Part A Benefit:** Average of the highest three consecutive years of compensation **Part B Benefit:** Average of the highest five consecutive years of compensation **Part C Benefit:** Average of the highest five consecutive years of compensation
Years of Service	Years or fractional years of full-time service rendered to the plan sponsor.
Benefit	a) An annuity which is actuarially equivalent to the accumulated contributions of the member at the time of retirement. b) A pension which together with the annuity produces a total annual retirement allowance equal to the sum of Part A, Part B, and Part C benefits each of which is the product of the applicable benefit formula multiplier, the applicable average highest compensation, and the applicable number of years of service. Early Retirement Benefit is actuarially reduced from normal retirement age.

Group F:

Normal Retirement Eligibility	Age 60 with 5 years of service or 30 years of service.
Early Retirement Eligibility	Age 55 with 25 years of service.

Retirement benefit is composed of as many as three components:

Part A Benefit: for service earned through June 30, 2011

	Part B Benefit: for service earned on and after July 1, 2011 up to a combined (Part A and B) 20 years of service
	Part C Benefit: for service earned on or after July 1, 2011 in excess of a combined (Part A and B) 20 years of service.
Benefit Formula Multiplier	**Part A Benefit:** Members hired prior to July 12, 1998 were given a one-time irrevocable option to choose either the benefit formula using a 2.22% multiplier or the benefit formula using a 2.50% multiplier. For members hired on or after July 12, 1998, benefits are calculated using a 2.50% multiplier.
	Part B Benefit: Members hired prior to July 12, 1998 were given a one-time irrevocable option to choose either the benefit formula using a 2.22% multiplier or the benefit formula using a 2.50% multiplier. For members hired on or after July 12, 1998, benefits are calculated using a 2.50% multiplier.
	Part C Benefit: 2.20% multiplier
Average Highest Compensation	**Part A Benefit:** Average of the highest three consecutive years of compensation
	Part B Benefit: Average of the highest five consecutive years of compensation
	Part C Benefit: Average of the highest five consecutive years of compensation
Years of Service	Years or fractional years of full-time service rendered to the plan sponsor.
Benefit	a) An annuity which is actuarially equivalent to the accumulated contributions of the member at the time of retirement. b) A pension which together with the annuity produces a total annual retirement allowance equal to the sum of Part A, Part B, and Part C benefits each of which is the product of the applicable benefit formula multiplier, the applicable average highest compensation, and the applicable number of years of service.

Early Retirement Benefit is actuarially reduced from normal retirement age.

Group G

Normal Retirement Eligibility	Age 67 with 5 years of service or age 62 with 30 years of service.
Early Retirement Eligibility	Age 57 with 15 years of service.
Benefit Formula Multiplier	Benefit is calculated using a 2.20% multiplier for all years of service up to 30 years and a 2.00% multiplier for all service in excess of 30 years.
Average Highest Compensation	Average of the highest five consecutive years of compensation.
Years of Service	Years or fractional years of full-time service rendered to the plan sponsor.
Benefit	a) An annuity which is actuarially equivalent to the accumulated contributions of the member at the time of retirement. b) A pension which together with the annuity produces a total annual retirement allowance equal to the product of the applicable benefit formula multiplier, the member's average highest compensation, and the number of years of service. Early Retirement Benefit is actuarially reduced from normal retirement age.

Miscellany for All Groups

In no event shall the retirement allowance be greater than 90% of a member's average highest compensation.

In no event shall the retirement allowance be greater than that permitted by Section 415 of the Internal Revenue Code.

The average highest compensation used in the calculation of benefits depends on which benefit formula applies to the member. The formula that uses the 2.22% multiplier includes overtime compensation and the lump sum payment for unused vacation, unused sick-pay, etc. The formulas that use all other multipliers do not include overtime or the lump sum payment.

Disability Retirement Benefit

Eligibility	5 years of service.
Benefit	90% of normal retirement benefit at disability date but not less than the smaller of: (1) 25% of average highest compensation (2) 90% of the retirement benefit member would have become entitled to had he continued in service to normal retirement age without further change in average highest compensation.

Deferred Vested Retirement Benefit

Eligibility	5 years of service.
Benefit	Normal retirement benefit beginning at normal retirement age.

Preretirement Death Benefit

(1) Refund of contributions with interest.

(2) Survivor Benefits according to type of survivors if member has at least 18 months of service.

Postretirement Death Benefit

(1) Lump sum $5,000 for group AB only.

(2) If no Joint and Survivor Option is selected, balance of member contributions not received back in retirement benefit payments prior to death.

Optional Forms of Benefit

(1) Joint and 100% Survivor Payment

(2) Joint and 50% Survivor Payment

(3) 66 2/3% Joint and Survivor Payment

(4) 80% Joint and Survivor Payment

COLA Increases

<u>Group A and B:</u>	3% simple COLA based on the participant's benefit on January 1, 2016 including all previously granted COLA's. Effective January 1, 2016 the COLA will be suspended for a 3-year period. In the third year of the COLA suspension (calendar year 2018), members will receive a one-time payment that is the lesser of 3% of their base pension benefit or $1,000. This payment will be made on January 1, or the anniversary date of the member's retirement according to when the member normally receives a COLA.
<u>Group C, D, E, F, and G:</u>	3% simple COLA based on initial gross monthly benefit with a 3-year delay following each participant's date of retirement.
Poverty Exception:	Any member of the Retirees Class or Current Employees Class who retired or retires with at least 5-years of service and whose household income is below 150% of federal poverty guidelines will receive a 3% compounding COLA until such time income exceeds 150% of federal poverty guidelines at which point the participant will receive a 3% simple COLA.

Contributions

By Members:	Each member, commencing January 1, 1978, contributes at a rate of 7.0% of the salary used to compute retirement benefits until his retirement. Beginning January 1, 2010, the employee contribution rate was increased 0.5% per year over 4 years to reach 9.0% of pay. The CSA establishes the contribution rate for members shall not exceed 9.0% of pay for the term of the agreement.
By Employers:	The sponsoring employer makes annual contributions based on members' salaries so that, when members become eligible for benefits, reserves will have been accumulated adequate to provide the pension and other benefits payable by the plan on account of creditable service.

Deferred Retirement Option Plan (DROP)

Eligibility	Current Employees Class members with at least 30 years of service.
Maximum Participation Period	5 years.
Minimum Participation Period	Participation in DROP for less than 2 years results in forfeiture of all interest earnings credited to the member's DROP account.
Benefit	Monthly pension benefit calculated as if eligible member actually retired on their DROP effective date, including any adjustments for an assigned optionee. The monthly pension benefit will be contributed to the member's DROP account in the CRS Pension Trust and paid out as a lump sum upon termination from the DROP.
Employee Contributions	Members continue to contribute 9% of pay while participating in DROP. A portion (75%) of the contribution is credited to the member's DROP account and the remaining portion (25%) of the contribution is paid to the CRS Pension Trust to offset the costs of administering the DROP.
Employer Contributions	Employer contributions to the CRS Pension Trust continue to apply in the same manner as for other actively employed members who are not participating in the DROP. Employer contributions are not credited to the member's DROP account.
Interest	DROP account balances are credited each month at a rate equal to the 10-year U.S. Treasury Note Business Day Series adjusted quarterly with a cap of 5% but not less than 0%.

APPENDIX C

STATEMENT OF ACTUARIAL ASSUMPTIONS AND METHODS

Actuarial assumptions and methods adopted by the Board March 1, 2018.

INVESTMENT RATE OF RETURN: 7.50% per year, net of investment expenses.

INFLATION ASSUMPTION: 2.75% per annum.

SALARY INCREASES: Salary increases are assumed to vary by service. Representative rates are as follows:

Service	Annual Increase
0	7.50%
5	5.00
10	4.50
15	4.00
21+	3.75

SEPARATIONS FROM ACTIVE SERVICE: For death rates, RP-2014 Employees Mortality Table with a generational approach using the MP-2017 projection scale was used. Representative values of the assumed annual rates of separation from active service are as follows:

	Annual Rate of Withdrawal			
Age	Less than One Year of Service	Between One and Three Years of Service	Between Three and Five Years of Service	Five or More Years of Service
20	22.00%	10.00%	8.00%	4.00%
25	22.00	10.00	8.00	4.00
30	22.00	10.00	8.00	4.00
35	22.00	10.00	4.00	4.00
40	22.00	10.00	4.00	2.75
45	22.00	10.00	4.00	1.25
50	22.00	10.00	4.00	1.25
55	22.00	10.00	4.00	1.25
60	22.00	10.00	4.00	1.25
65	22.00	10.00	4.00	1.25
70	22.00	10.00	4.00	1.25

Age	Annual Rate of Disability*
20	0.005%
25	0.010
30	0.015
35	0.025
40	0.045
45	0.075
50	0.135
55	0.210
60	0.250
65	0.250

* Rates are 0% when member is eligible for normal retirement

	Annual Rate of Retirement Groups C, E, and F*				
Age	5 Years of Service	6-24 Years of Service	25-29 Years of Service	30 Years of Service	31+ Years of Service
50				55.0	30.0
55			6.0%	55.0	30.0
56			8.0	55.0	30.0
57			10.0	55.0	30.0
58			10.0	55.0	30.0
59			10.0	55.0	30.0
60	25.0%	25.0%	25.0	55.0	25.0
61	25.0	18.0	18.0	55.0	25.0
62	25.0	18.0	18.0	55.0	25.0
63	25.0	18.0	18.0	55.0	25.0
64	25.0	18.0	18.0	55.0	25.0
65	25.0	18.0	18.0	55.0	25.0
70	100.0	100.0	100.0	100.0	100.0

* For purposes of valuing CSA Employee members eligible for DROP benefits, an additional 10% is added to rates for 30 years of service and an additional 5% is added to rates for 31+ years of service.

Age	5 Years of Service	6-14 Years of Service	15-29 Years of Service	30 Years of Service	31+ Years of Service
	Annual Rate of Retirement Group G				
57			6.0%	6.0%	6.0%
58			6.0	6.0	6.0
59			8.0	8.0	8.0
60			8.0	8.0	8.0
61			10.0	10.0	10.0
62			10.0	25.0	25.0
63			10.0	25.0	18.0
64			10.0	25.0	18.0
65			10.0	25.0	18.0
66			10.0	25.0	18.0
67	25.0%	25.0%	25.0	25.0	18.0
68	25.0	18.0	18.0	18.0	18.0
69	25.0	18.0	18.0	18.0	18.0
70	100.0	100.0	100.0	100.0	100.0

DEATHS AFTER RETIREMENT: The RP-2014 Mortality Table with a generational approach using the MP-2017 projection scale and set forward two years for both males and females is used for the period after retirement and for dependent beneficiaries. The RP-2014 Disabled Retiree Mortality Table with a generational approach using the MP-2017 projection scale is used for the period after disability.

EXPENSES: Estimated budgeted administrative expenses of 0.80% of payroll are added to the normal cost rate.

WITHDRAWAL ASSUMPTION: It is assumed that 60% of vested members who terminate elect to leave their contributions in the plan in order to be eligible for a benefit at their normal retirement date while the remaining 40% elect to withdraw their contributions.

PERCENT MARRIED: 80% of members are assumed to be married for the purposes of valuing pre-retirement survivor benefits.

SPOUSE AGE DIFFERENCE: Unless otherwise reported in the data, males are assumed to be three years older than his spouse.

ASSETS: Market Value of Assets

PART-TIME ACTIVE MEMBERS: All part-time active members are assumed to receive a refund of their employee contributions with interest upon leaving the System.

DROP PARTICIPATION: 60% of eligible CSA Employee members eligible for DROP benefits are assumed to decline participation and 40% are assumed to elect participation. Those electing to participate are assumed to remain in the DROP for 3 years.

DROP CREDITING RATE: 3.25% annually.

VALUATION METHOD: Entry age actuarial cost method.

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city of CINCINNATI RETIREMENT

GASB STATEMENT NO. 68 REPORT

FOR THE

RETIREMENT SYSTEM FOR EMPLOYEES

OF THE CITY OF CINCINNATI

PREPARED AS OF JUNE 30, 2018

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October 10, 2018

Board of Trustees
Retirement System for Employees of the City of Cincinnati
801 Plum Street, Suite 328
Cincinnati, OH 45202

Dear Members of the Board:

Presented in this report is information to assist the Retirement System for Employees of the City of Cincinnati (System) in meeting the requirements of the Governmental Accounting Standards Board (GASB) Statement No. 68. The information is presented for the period ending June 30, 2018 (the Measurement Date) to assist the System in better understanding the requirements of GASB 68 and to identify the information to be provided by the System's actuary, Cavanaugh Macdonald Consulting (CMC).

GASB Statement No. 68 established accounting and financial reporting requirements for governmental employers that provide pension benefits to their employees through a trust.

The annual actuarial valuation used as a basis for much of the information presented in this report was performed as of December 31, 2017. The valuation was based upon data, furnished by the System, concerning active, inactive and retired members along with pertinent financial information.

To the best of our knowledge, this report is complete and accurate. The necessary calculations were performed by, and under the supervision of, independent actuaries who are members of the American Academy of Actuaries with experience in performing valuations for public retirement Plans.

The calculations were prepared in accordance with the principles of practice prescribed by the Actuarial Standards Board, and, in our opinion, meet the requirements of GASB 68.

The actuarial calculations were performed by qualified actuaries according to generally accepted actuarial procedures and methods. The calculations are based on the current provisions of the Plan, and on actuarial assumptions that are, individually and in the aggregate, internally consistent and reasonably based on the actual experience of the Plan. In addition, the calculations were completed in compliance with the laws governing the Plan. The undersigned are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

These results are only for financial reporting and may not be appropriate for funding purposes or other types of analysis. Calculations for purposes other than satisfying the requirements of GASB 68 may produce significantly different results. Future actuarial results may differ significantly from the current results presented in this report due to such factors as changes in plan experience or changes in economic or demographic assumptions.

Respectfully submitted,

Edward J. Koebel

Edward J. Koebel, EA, FCA, MAAA
Principal and Consulting Actuary

Ben Mobley

Ben D. Mobley, ASA, FCA, MAAA
Senior Actuary

EJK/BDM

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**REPORT OF THE ANNUAL GASB STATEMENT NO. 68
REQUIRED INFORMATION FOR THE
RETIREMENT SYSTEM FOR THE EMPLOYEES
OF THE CITY OF CINCINNATI**

PREPARED AS OF JUNE 30, 2018

SECTION I – INTRODUCTION

The Governmental Accounting Standards Board issued Statement No. 68 (GASB 68), "Accounting and Financial Reporting For Pensions", in June 2013. This report has been prepared as of June 30, 2018. Much of the material provided in this report is based on the data, assumptions and results of the annual actuarial valuation of the System as of December 31, 2017. The results of that valuation were detailed in a report dated June 7, 2018.

The NPL shown in the GASB Statement Number 67 Report for the Retirement System for Employees of the City of Cincinnati prepared as of June 30, 2018 and submitted October 9, 2018 is the NPL used for purposes of GASB 68. Please refer to that report for the derivation of the NPL.

Pension Expense includes amounts for service cost (the Normal Cost under EAN for the year), interest on the NPL, changes in benefit structure, amortization of increases/decreases in liability due to actuarial experience and actuarial assumption changes, and amortization of investment gains/losses. The actuarial experience and assumption change impacts are amortized over the remaining service life of the System membership as of the Measurement Date, and investment gains/losses are amortized over five years. The development of the PE is shown in Section IV.

The unamortized portions of each year's experience, assumption changes and investment gains/losses are used to develop deferred inflows and outflows, which also must be included on the employer's balance sheet. The development of the deferred inflows and outflows is shown in Section III.

The sections that follow provide the results of all the necessary calculations, presented in the order laid out in GASB 68 for note disclosure and Required Supplementary Information (RSI).

SECTION II - SUMMARY OF PRINCIPAL RESULTS
($ IN THOUSANDS)

Valuation Date (VD):	December 31, 2017
Prior Measurement Date:	June 30, 2017
Measurement Date (MD):	June 30, 2018
Reporting Date (RD):	June 30, 2018
Single Equivalent Interest Rate (SEIR):	
Long-Term Expected Rate of Return	7.50%
Municipal Bond Index Rate at Prior Measurement Date	3.56%
Municipal Bond Index Rate at Measurement Date	3.89%
Fiscal Year in which Plan's Fiduciary Net Position is projected to be depleted from future benefit payments for current members	N/A
Single Equivalent Interest Rate at Prior Measurement Date	7.50%
Single Equivalent Interest Rate at Measurement Date	7.50%
Net Pension Liability:	
Total Pension Liability (TPL)	$ 2,359,689
Fiduciary Net Position (FNP)	1,762,196
Net Pension Liability (NPL = TPL – FNP)	$ 597,493
FNP as a percentage of TPL	74.68%
Pension Expense (PE):	$49,729
Deferred Outflows of Resources:	$42,869
Deferred Inflows of Resources:	$137

SECTION III – FINANCIAL STATEMENT NOTES

The material presented herein will follow the order presented in GASB 68. Paragraph numbers are provided for ease of reference.

Paragraphs 40(a) and (b): The information required is to be supplied by the Employer.

Paragraph 40(c): The data required regarding the membership of the Retirement System for Employees of the City of Cincinnati were furnished by the System. The following table summarizes the membership of the System as of December 31, 2017, the Valuation Date.

Membership

	Number
Retired participants and beneficiaries currently receiving benefits	4,233
Terminated participants and beneficiaries entitled to benefits but not yet receiving benefits	211
Inactive participants*	8,472
Active participants	
Full-Time	3,029
Part-Time	742
Total	16,687

* Includes 108 members participating in the Deferred Retirement Option Plan (DROP) as of December 31, 2017.

**Participants who are former employees who have an employee account balance in the plan but are not otherwise vested in an employer provided benefit.

Paragraphs 40(d) and (e): The information required is to be supplied by the Employer.

Paragraphs 41: This paragraph requires information regarding the actuarial assumptions used to measure the TPL. The actuarial assumptions utilized in developing the TPL are outlined in Appendix C. The total pension liability was determined by an actuarial valuation as of December 31, 2017, using the following actuarial assumptions, applied to all periods included in the measurement and rolled forward to the measurement date of June 30, 2018:

Inflation	2.75 percent
Salary increases, including inflation	3.75 to 7.50 percent
Long-Term Investment Rate of Return, net of pension plan investment expense, including inflation	7.50 percent
Municipal Bond Index Rate	
Prior Measurement Date	3.56 percent
Measurement Date	3.89 percent
Year FNP is projected to be depleted	N/A
Single Equivalent Interest Rate, net of pension plan investment expense, including inflation	
Prior Measurement Date	7.50 percent
Measurement Date	7.50 percent
Mortality	Pre-retirement mortality rates were based on the RP-2014 Employees Mortality Table with a generational approach using the MP-2017 projection scale. Post-retirement mortality rates were based on the RP-2014 Mortality Table with a generational approach using the MP-2017 projection scale and set forward two years for both males and females. Post-disability mortality rates were based on the RP-2014 Disabled Retiree Mortality Table with a generational approach using the MP-2017 projection scale.

The actuarial assumptions used in the December 31, 2017 valuation were based on the results of the last actuarial experience study, dated February 28, 2018.

Paragraph 42

- **(a) Discount rate**. The discount rate used to measure the total pension liability was 7.50% as of June 30, 2017 and as of June 30, 2018.
- **(b) Projected cash flows:** The projection of cash flows used to determine the discount rate assumed that plan member contributions of 9.0% and Employer contributions of 16.25% will be made as set out in City Council ordinance and the Collaborative Settlement Agreement.
- **(c) Long term rate of return:** The long-term expected rate of return on pension plan investments was determined using a log-normal distribution analysis in which best-estimate ranges of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class. These ranges are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and by adding expected inflation.
- **(d) Municipal bond rate:** The municipal bond rate was not needed as of June 30, 2018 as the FNP is projected to not be depleted during the projection period.
- **(e) Periods of projected benefit payments:** Projected future benefit payments for all current plan members were projected through 2117.

(f) Assumed asset allocation: The target asset allocation and best estimates of arithmetic real rates of return for each major asset class are summarized in the following table:

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return*
Core Bonds	14.00%	2.80%
High Yield Bonds	3.00%	4.90%
Large-Cap Value Equity	7.00%	7.20%
Large-Cap Growth Equity	5.00%	7.10%
Mid-Cap Value Equity	4.00%	7.50%
Mid-Cap Core Equity	4.00%	7.50%
Small-Cap Value Equity	7.50%	8.00%
Non-U.S. Developed Large Cap	10.00%	7.40%
Non-U.S. Small Cap	5.00%	8.10%
Emerging Markets All-Cap	5.00%	8.50%
EM Small-Cap	3.00%	8.50%
Real Estate Core Equity	10.00%	7.40%
Infrastructure	7.50%	7.80%
Risk Parity	5.00%	4.10%
Private Equity	10.00%	11.10%
Total	100.00%	

*Geometric mean

(g): **Sensitivity analysis**: This is the disclosure of the sensitivity of the NPL to changes in the discount rate. The following presents the NPL of the System, calculated using the discount rate of 7.50 percent, as well as what the System's NPL calculated using a discount rate that is 1-percentage-point lower (6.50 percent) or 1-percentage-point higher (8.50 percent) than the current rate:

($ thousands)	1% Decrease (6.50%)	Current Discount Rate (7.50%)	1% Increase (8.50%)
System's Net Pension Liability	$842,596	$597,493	$389,402

Paragraph 44: This paragraph requires a schedule of changes in Net Pension Liability. The needed information is provided in the table below.

CHANGES IN THE NET PENSION LIABILITY
($ thousands)

	Total Pension Liability (a)	Plan Fiduciary Net Position (b)	Net Pension Liability (a) – (b)
Balances at June 30, 2017	$2,261,743	$1,740,390	$521,353
Changes for the year:			
Service cost	22,834		22,834
Interest	163,313		163,313
Benefit changes	0		0
Difference between expected and actual experience	29,889		29,889
Changes of assumptions	50,392		50,392
Contributions - employer		32,586	(32,586)
Contributions - employee		18,873	(18,873)
Net investment income		140,314	(140,314)
Benefit payments, including refunds of employee contributions	(168,482)	(168,482)	0
Administrative expense		(1,485)	1,485
Other changes	0	0	0
Net changes	97,946	21,806	76,140
Balances at June 30, 2018	$2,359,689	$1,762,196	$597,493

Paragraph 45(a): The date of the actuarial valuation upon which the TPL is based is December 31, 2017. The TPL as of June 30, 2018 is determined using standard roll forward techniques. The roll forward calculation adds the normal cost for the first half of 2018 (also called the service cost), subtracts the actual benefit payments and refunds for the six months, and then applies the expected SEIR for the period. This procedure was used to determine the TPL as of June 30, 2018, as shown in the following table. In addition, an expected TPL as of June 30, 2018 is determined by rolling forward the June 30, 2017 TPL using similar techniques. The difference between this expected TPL and the actual TPL as of June 30, 2018 is the experience gain or loss for the period. The impact of the assumption changes adopted by the Board on March 1, 2018 are shown as an assumption change loss.

TPL Roll-Forward ($ thousands)		New Assumptions
	(1)	(2)
(a) Interest Rate (SEIR)	7.50%	7.50%
(b) TPL as of December 31, 2017	$2,298,598	$2,346,906
(c) Entry Age Normal Cost for the period January 1, 2018 – June 30, 2018	11,838	12,143
(d) Actual Benefit Payments and Refunds for the period January 1, 2018 – June 30, 2018	$84,241	$84,241
(e) TPL as of June 30, 2018 $= [(b) \times (1 + (a))^{1/2}] + (c) - [(d) \times (1 + (a))^{1/4}]$	$2,309,297	$2,359,689
(f) June 30, 2017 TPL Rolled Forward to June 30, 2018	2,279,408	
(g) Experience (Gain)/Loss: (1e) – (1f)	$29,889	
(h) Assumption (Gain)/Loss: (2e) – (1e)		$50,392

Paragraph 45(c): Since the prior measurement date, there were several changes in actuarial assumptions and methods used in the measurement of the total pension liability as a result of an experience study report dated February 28, 2018.

- The price inflation assumption was decreased from 3.00% to 2.75%.
- Retirement, withdrawal, and disability rates were changed to more closely reflect recent experience.
- Mortality rates for all members were changed to a generational approach using the RP-2014 mortality tables.
- Merit salary scale was changed to more closely reflect recent experience.
- Assumed administrative expense as a percentage of payroll added to the total normal cost was increased from 0.75% to 0.80%.
- The assumed proportion of deferred vested members who will elect to receive a deferred benefit and who will elect to withdraw their contributions was changed to more closely reflect recent experience.
- The assumed percentage of members who are married for the purposes of valuing pre-retirement survivor benefits was changed.

Paragraph 45(d): There have been no changes in benefit terms used in the measurement of the total pension liability since the prior measurement date.

Paragraph 45(f): There have been no known changes between the measurement date of the net pension liability and reporting date that are expected to have a significant effect on the net pension liability.

Paragraph 45(g): The information required is to be supplied by the Employer.

Paragraph 45(h): Since certain expense items are amortized over closed periods each year, the deferred portions of these items must be tracked annually. If the amounts serve to reduce pension expense they are labeled deferred inflows. If they will increase pension expense they are labeled deferred outflows. The amortization of these amounts is accomplished on a level dollar basis, with no interest included in the deferred amounts. Experience gains/losses and the impact of changes in actuarial assumptions, if any, are amortized over the average remaining service life of the active and inactive System members at the beginning of the fiscal year. Investment gains and losses are amortized over a fixed five year period.

The table below provides a summary of the deferred inflows and outflows as of June 30, 2018.

($ thousands)	Deferred Outflows of Resources	Deferred Inflows of Resources
Differences between expected and actual experience	$16,025	$0
Changes of assumptions	26,844	0
Net difference between projected and actual earnings on plan investments	0	137
Employer contributions subsequent to the Measurement Date	0	$0
Total	$42,869	$137

Paragraph 45(i): Amounts reported as deferred outflows of resources and deferred inflows of resources related to pensions will be recognized in pension expense as follows:

Year Ended June 30:	
2019	$55,876
2020	10,540
2021	(20,839)
2022	(2,845)
2023	0
Thereafter	0

Amounts reported as deferred outflows of resources related to pensions resulting from employer contributions subsequent to the measurement date will be recognized as a reduction of the net pension liability in the year ended June 30, 2018 (Reporting Date). Other amounts reported as deferred outflows of resources and deferred inflows of resources related to pensions will be recognized in pension expense.

Collective Deferred Outflows and Inflows between Expected and Actual Experience					
				Balances as of June 30, 2018 (Reporting Date)	
Year	Experience Losses (a)	Experience Gains (b)	Amounts Recognized in Pension Expense through 2018 (c)	Deferred Outflows (a) - (c)	Deferred Inflows (b) - (c)
2018	$29,889	$0	$13,967	$15,922	$0
2017	3,545	0	3,442	103	0
2016	4,137	0	4,137	0	0
2015	0	14,024	14,024	0	0
2014	0	0	0	0	0
Total				$16,025	$0

Collective Deferred Outflows and Inflows for Differences from Assumption Changes					
				Balances as of June 30, 2018 (Reporting Date)	
Year	Assumption Losses (a)	Assumption Gains (b)	Amounts Recognized in Pension Expense through 2018 (c)	Deferred Outflows (a) - (c)	Deferred Inflows (b) - (c)
2018	$50,392	$0	$23,548	$26,844	$0
2017	0	0	0	0	0
2016	0	627,693	627,693	0	0
2015	155,948	0	155,948	0	0
2014	0	17,827	17,827	0	0
Total				$26,844	$0

Collective Deferred Outflows and Inflows for Differences in Investment Experience					
				Balances as of June 30, 2018 (Reporting Date)	
Year	**Investment Losses (a)**	**Investment Gains (b)**	**Amounts Recognized in Pension Expense through 2018 (c)**	**Deferred Outflows (a) - (c)**	**Deferred Inflows (b) - (c)**
2018	$0	$14,229	$2,846	$0	$11,383
2017	0	89,957	35,982	0	53,975
2016	130,626	0	78,375	52,251	0
2015	64,854	0	51,884	12,970	0
2014	0	155,359	155,359	0	0
Total				$65,221	$65,358
Net difference between projected and actual earnings on investments					$137

Amortization of Deferrals
($ in thousands)

Fiscal Year End	2014 Experience (Gain)/Loss		2015 Experience (Gain)/Loss		2016 Experience (Gain)/Loss		2017 Experience (Gain)/Loss		2018 Experience (Gain)/Loss		Total Experience Deferrals	
	Amount Recognized	EOY Balance	Amount Recognized	EOY Balance	Amount Recognized	EOY Balance	Amount Recognized	EOY Balance	Amount Recognized	EOY Balance	Amount Recognized	EOY Balance
6/30/2014	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
6/30/2015	0	0	(7,012)	(7,012)	0	0	0	0	0	0	(7,012)	(7,012)
6/30/2016	0	0	(7,012)	0	2,008	2,129	0	0	0	0	(5,004)	2,129
6/30/2017	0	0	0	0	2,008	121	1,721	1,824	0	0	3,729	1,945
6/30/2018	0	0	0	0	121	0	1,721	103	13,967	15,922	15,809	16,025
6/30/2019	0	0	0	0	0	0	103	0	13,967	1,955	14,070	1,955
6/30/2020	0	0	0	0	0	0	0	0	1,955	0	1,955	0
6/30/2021	0	0	0	0	0	0	0	0	0	0	0	0
6/30/2022	0	0	0	0	0	0	0	0	0	0	0	0

Amortization of Deferrals
($ in thousands)

Fiscal Year End	2014 Assumption (Gain)/Loss		2015 Assumption (Gain)/Loss		2016 Assumption (Gain)/Loss		2017 Assumption (Gain)/Loss		2018 Assumption (Gain)/Loss		Total Assumption Deferrals	
	Amount Recognized	EOY Balance	Amount Recognized	EOY Balance	Amount Recognized	EOY Balance	Amount Recognized	EOY Balance	Amount Recognized	EOY Balance	Amount Recognized	EOY Balance
6/30/2014	($4,155)	($13,672)	$0	$0	$0	$0	$0	$0	$0	$0	($4,155)	($13,672)
6/30/2015	(4,155)	(9,517)	77,974	77,974	0	0	0	0	0	0	73,819	68,457
6/30/2016	(4,155)	(5,362)	77,974	0	(304,705)	(322,988)	0	0	0	0	(230,886)	(328,350)
6/30/2017	(4,155)	(1,207)	0	0	(304,705)	(18,283)	0	0	0	0	(308,860)	(19,490)
6/30/2018	(1,207)	0	0	0	(18,283)	0	0	0	23,548	26,844	4,058	26,844
6/30/2019	0	0	0	0	0	0	0	0	23,548	3,296	23,548	3,296
6/30/2020	0	0	0	0	0	0	0	0	3,296	0	3,296	0
6/30/2021	0	0	0	0	0	0	0	0	0	0	0	0
6/30/2022	0	0	0	0	0	0	0	0	0	0	0	0

Amortization of Deferrals
($ in thousands)

Fiscal Year End	2014 Investment (Gain)/Loss Amount Recognized	2014 Investment (Gain)/Loss EOY Balance	2015 Investment (Gain)/Loss Amount Recognized	2015 Investment (Gain)/Loss EOY Balance	2016 Investment (Gain)/Loss Amount Recognized	2016 Investment (Gain)/Loss EOY Balance	2017 Investment (Gain)/Loss Amount Recognized	2017 Investment (Gain)/Loss EOY Balance	2018 Investment (Gain)/Loss Amount Recognized	2018 Investment (Gain)/Loss EOY Balance	Total Investment Deferrals Amount Recognized	Total Investment Deferrals EOY Balance
6/30/2014	($31,072)	($124,287)	$0	$0	$0	$0	$0	$0	$0	$0	($31,072)	($124,287)
6/30/2015	(31,072)	(93,215)	12,971	51,883	0	0	0	0	0	0	(18,101)	(41,332)
6/30/2016	(31,072)	(62,143)	12,971	38,912	26,125	104,501	0	0	0	0	8,024	81,270
6/30/2017	(31,072)	(31,071)	12,971	25,941	26,125	78,376	(17,991)	(71,966)	0	0	(9,967)	1,280
6/30/2018	(31,071)	0	12,971	12,970	26,125	52,251	(17,991)	(53,975)	(2,846)	(11,383)	(12,812)	(137)
6/30/2019	0	0	12,970	0	26,125	26,126	(17,991)	(35,984)	(2,846)	(8,537)	18,258	(18,395)
6/30/2020	0	0	0	0	26,126	0	(17,991)	(17,993)	(2,846)	(5,691)	5,289	(23,684)
6/30/2021	0	0	0	0	0	0	(17,993)	0	(2,846)	(2,845)	(20,839)	(2,845)
6/30/2022	0	0	0	0	0	0	0	0	(2,845)	0	(2,845)	0

Amortization of Deferrals
($ in thousands)

Fiscal Year End	Total Experience Deferrals Amount Recognized	Total Experience Deferrals EOY Balance	Total Assumption Deferrals Amount Recognized	Total Assumption Deferrals EOY Balance	Total Investment Deferrals Amount Recognized	Total Investment Deferrals EOY Balance	Total Deferrals Amount Recognized	Total Deferrals EOY Balance
6/30/2014	$0	$0	($4,155)	($13,672)	($31,072)	($124,287)	($35,227)	($137,959)
6/30/2015	(7,012)	(7,012)	73,819	68,457	(18,101)	(41,332)	48,706	20,113
6/30/2016	(5,004)	2,129	(230,886)	(328,350)	8,024	81,270	(227,866)	(244,951)
6/30/2017	3,729	1,945	(308,860)	(19,490)	(9,967)	1,280	(315,098)	(16,265)
6/30/2018	15,809	16,025	4,058	26,844	(12,812)	(137)	7,055	42,732
6/30/2019	14,070	1,955	23,548	3,296	18,258	(18,395)	55,876	(13,144)
6/30/2020	1,955	0	3,296	0	5,289	(23,684)	10,540	(23,684)
6/30/2021	0	0	0	0	(20,839)	(2,845)	(20,839)	(2,845)
6/30/2022	0	0	0	0	(2,845)	0	(2,845)	0

SECTION IV – PENSION EXPENSE

As noted earlier, the Pension Expense (PE) consists of a number of different items. GASB 68 refers to the first as Service Cost which is the Normal Cost using the Entry Age Normal (EAN) actuarial funding method. The second item is interest on the beginning of year TPL and the cash flows during the year at the SEIR rate of return in effect as of the previous measurement date.

The next three items refer to any changes that occurred in the TPL due to:

- benefit changes,
- actual versus expected experience or
- changes in actuarial assumptions.

Benefit changes, which are reflected immediately in PE, can be positive, if there is a benefit improvement for existing System members, or negative if there is a benefit reduction.

The next items to be recognized are the portion of current year changes in TPL due to actual versus expected experience for the year and the portion of current year changes in TPL due to changes in actuarial assumptions. The portion to recognize in the current year is determined by spreading the total change over the average expected remaining service life of the entire System membership from the prior year. The remaining service life of active members is the average number of years they are expected to remain active. For the year ended June 30, 2018 this number is 11.51. The remaining service life of the inactive members is, of course, zero. Therefore, the figure to use for the amortization is the weighted average of these two amounts, or 2.14. The table below provides the calculation of the average remaining future service life.

Category	Number (1)	Average Years of Future Service Life (2)
a. Full-Time Active Members	3,020	11.51
b. Remaining Members	13,239	0.00
c. Total	16,259	
Weighted Average Years of Future Service Life [(a1 x a2) + (b1 x b2)]/c1		2.14

Member contributions for the year and projected earnings on the FNP, again at the rate used to calculate the liabilities, are subtracted from the amount determined thus far. The current year portions of previously determined experience, assumption, and investment earnings amounts, recognized as deferred inflows and outflows (see Section III) are included next. Deferred inflows are subtracted from the PE while deferred outflows are added to the PE. Finally, administrative expenses and other miscellaneous items are included.

The calculation of the Pension Expense is shown in the following table.

Pension Expense
For the Year Ended June 30, 2018
($ thousands)

Service Cost	$22,834
Interest on the total pension liability	163,313
Current-period benefit changes	0
Expensed portion of current-period difference between expected and actual experience in the total pension liability	13,967
Expensed portion of current-period changes of assumptions	23,548
Member contributions	(18,873)
Projected earnings on plan investments	(126,085)
Expensed portion of current-period differences between actual and projected earnings on plan investments	(2,846)
Administrative expense	1,485
Other	0
Recognition of beginning deferred outflows of resources as pension expense	1,842
Recognition of beginning deferred inflows of resources as pension expense	(29,456)
Pension Expense	$49,729

SECTION V – REQUIRED SUPPLEMENTARY INFORMATION

There are several tables of Required Supplementary Information (RSI) that need to be included in the System's financial statements:

Paragraphs 46(a) and (b): The required tables are provided in Schedule A and the information is as of the Measurement Dates.

Paragraph 46(c): The required table is provided in Schedule A and the information is as of the Employer's Fiscal Year Ends.

Paragraph 47: In addition the following should be noted regarding the RSI:

Changes of benefit terms:

- 2017
  - There were several changes in benefit provisions as a result of Ordinance 336-2016 adopted by the City Council on October 26, 2016. In addition to incorporating many of the changes mandated by the Collaborative Settlement Agreement (CSA), the Ordinance also:
    - Established benefit and eligibility provisions for Group E and F members not covered under the CSA similar to employees who are covered under the CSA.
    - Established a universal Cost-of-Living Adjustment (COLA) suspension period for all members.
    - Established a universal 3% simple COLA rate for all members.
- 2016
  - There were several changes in benefit provisions as a result of the Collaborative Settlement Agreement (CSA) between the City and various plaintiff groups representing certain active and retired members of CRS as approved by the Court on October 5, 2015 and generally effective January 1, 2016.

Changes in actuarial assumptions and methods:

- 2018
  - The price inflation assumption was decreased from 3.00% to 2.75%.
  - Retirement, withdrawal, and disability rates were changed to more closely reflect recent experience.

- Mortality rates for all members were changed to a generational approach using the RP-2014 mortality tables.
- Merit salary scale was changed to more closely reflect recent experience.
- Assumed administrative expense as a percentage of payroll added to the total normal cost was increased from 0.75% to 0.80%.
- The assumed proportion of deferred vested members who will elect to receive a deferred benefit and who will elect to withdraw their contributions was changed to more closely reflect recent experience.
- The assumed percentage of members who are married for the purposes of valuing pre-retirement survivor benefits was changed.

Method and assumptions used in calculations of actuarially determined contributions. The actuarially determined contribution rates in the schedule of employer contributions are calculated as of December 31, eighteen months prior to the end of the fiscal year in which contributions are reported (as of December 31, 2016 for the fiscal year 2018 contributions). The following actuarial methods and assumptions were used to determine actuarial contribution rates reported in that schedule:

Actuarial cost method	Entry age
Amortization method	Level dollar, open
Remaining amortization period	30 years
Asset valuation method	5-year smoothed market
Inflation	3.00 percent
Salary increase	4.00 to 7.00 percent, including inflation
Investment rate of return	7.50 percent, net of pension plan investment expense, and including inflation

APPENDIX A

REQUIRED SUPPLEMENTARY INFORMATION

SCHEDULE OF CHANGES IN THE NET PENSION LIABILITY
($ thousands)

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Total pension liability											
Service Cost	$ 25,937	$ 27,785	$ 31,764	$ 20,576	$ 22,834						
Interest	148,408	149,052	143,383	159,912	163,313						
Benefit changes	0	0	(76,301)	29,208	0						
Difference between expected and actual experience	0	(14,024)	4,137	3,545	29,889						
Changes of assumptions	(17,827)	155,948	(627,693)	0	50,392						
Benefit payments	(156,149)	(159,176)	(162,103)	(165,986)	(166,645)						
Refunds of contributions	(1,785)	(2,231)	(1,828)	(1,334)	(1,837)						
Net change in total pension liability	(1,416)	157,354	(688,641)	45,921	97,946						
Total pension liability - beginning	2,748,525	2,747,109	2,904,463	2,215,822	2,261,743						
Total pension liability - ending (a)	$ 2,747,109	$ 2,904,463	$ 2,215,822	$ 2,261,743	$ 2,359,689						
Plan net position											
Contributions - employer	$ 37,739	$ 29,084	$ 67,939	$ 30,868	$ 32,586						
Contributions - member	15,059	16,186	16,337	17,740	18,873						
Net investment income	258,382	49,138	(11,631)	209,299	140,314						
Benefit payments	(156,149)	(159,176)	(162,103)	(165,986)	(166,645)						
Administrative expense	(1,383)	(1,570)	(5,418)	(1,572)	(1,485)						
Refunds of contributions	(1,785)	(2,231)	(1,828)	(1,334)	(1,837)						
Other	0	0	237,897	0	0						
Net change in plan net position	151,863	(68,569)	141,193	89,015	21,806						
Plan net position - beginning	1,426,888	1,578,751	1,510,182	1,651,375	1,740,390						
Plan net position - ending (b)	$ 1,578,751	$ 1,510,182	$ 1,651,375	$ 1,740,390	$ 1,762,196						
Net pension liability - ending (a) - (b)	$ 1,168,358	$ 1,394,281	$ 564,447	$ 521,353	$ 597,493						

SCHEDULE OF THE NET PENSION LIABILITY
($ thousands)

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Total pension liability	$2,747,109	$2,904,463	$2,215,822	$2,261,743	$2,359,689						
Plan net position	1,578,751	1,510,182	1,651,375	1,740,390	1,762,196						
Net pension liability	$1,168,358	$1,394,281	$ 564,447	$ 521,353	$ 597,493						
Ratio of plan net position to total pension liability	57.47%	52.00%	74.53%	76.95%	74.68%						
Covered-employee payroll	$ 163,477	$ 164,575	$ 174,963	$ 196,445	$ 208,317						
Net pension liability as a percentage of covered payroll	714.69%	847.20%	322.61%	265.39%	286.82%						

SCHEDULE OF EMPLOYER CONTRIBUTIONS
($ thousands)

	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Actuarially determined employer contribution	$ 48,046	$ 46,689	$ 69,939	$ 75,566	$ 78,101	$ 66,999	$ 49,952	$ 54,875	$ 80,882	$ 43,065
Actual employer contributions	32,586	30,868	67,939	29,084	37,739	37,192	33,608	31,160	30,029	26,650
Annual contribution deficiency (excess)	$ 15,460	$ 15,821	$ 2,000	$ 46,482	$ 40,362	$ 29,807	$ 16,344	$ 23,715	$ 50,853	$ 16,415
Covered-employee payroll	$ 208,317	$ 196,445	$ 174,963	$ 164,575	$ 163,477	$ 167,148	$ 167,148	$ 165,029	$ 167,589	$ 170,416
Actual contributions as a percentage of covered-employee payroll	15.64%	15.71%	38.83%	17.67%	23.09%	22.25%	20.11%	18.88%	17.92%	15.64%

Notes:

Fiscal year changed in 2013 from December 31 to June 30.

Actual employer contribution in 2016 included one-time amount to pay off remaining liability of the 2007 Early Retirement Incentive Program (ERIP).

APPENDIX B

SUMMARY OF BENEFIT PROVISIONS VALUED

Membership

All employees of the City shall be members of the System except for the following:

- Members of the Police and Fireman's Disability and Pension Fund of Ohio.
- Elected City officials.
- Employees for whom the City contributes to PERS.
- Members of the faculties, teaching staffs, research staffs, and administrative staff of the University of Cincinnati appointed to positions covered by the Teachers Insurance and Annuity Association Social Security Plan.
- Persons becoming employees after June 1, 1961, who are employed in any of the following employment classifications: bricklayer, carpenter, carpenter foreman, cement finisher, electrician, electrician foreman, painter, painter foreman, plasterer, plumber, sign painter, steamfitter and pipefitter, tinsmith, or composition roofer.
- Persons hired as police recruits who are not currently enrolled as a member of the System prior to their date of hire.
- Current contributing members of the School Employees Retirement System (SERS) or the State Teachers Retirement System (STRS) who are hired by the City on a seasonal, temporary, or part-time basis.

Members of the System are divided into the following groups:

Group	Criteria
A, B	Any member who has retired prior to 7/1/2011.
C	Any member who, as of June 30, 2011, was an active or deferred vested member and had either: a) Completed at least 30 years of service, or b) Reached age 60 and completed at least 5 years of service.

Group	Criteria
D	Any active member who, between July 1, 2011 and December 31, 2013: 1) Either a) Completed at least 30 years of service, or b) Reached age 60 and completed at least 5 years of service; and 2) Retired prior to January 1, 2014.
E	Any active member who: 1) Between July 1, 2011 and December 31, 2013 either: a) Completed at least 30 years of service, or b) Reached age 60 and completed at least 5 years of service; and 2) Retires on or after January 1, 2014.
F	Any active member whose most recent membership enrollment date was prior to January 1, 2010 and who is not in groups A through E. Any deferred vested member whose most recent membership enrollment date was prior to January 1, 2010, is not in groups A through E, and has at least five years of service prior to the date they separate from employment.
G	Any member whose most recent membership enrollment date is on or after January 1, 2010, or Any member rehired on or after January 1, 2010, who has fewer than 5 years of service as of June 30, 2011, or Any retiree of the System who is receiving a service retirement allowance and is re-employed on or after April 1, 2013.

Members in the System are further classified as follows:

Class	Criteria
CSA Retiree (CSA participants corresponding to Retirees Class)	Group A and B members and their designated optionees.
CSA Employee (CSA participants corresponding to Current Employees Class)	Group C, D, E, and F members (and their designated optionees) that were vested and employed on 7/1/2011.
CMC Employee (Non-CSA participants)	Group E and F members (and their designated optionees) that were either vested or employed on 7/1/2011 and no break in employment service since 1/1/2010 and prior to becoming vested.
Non-CSA	Group G members and their designated optionees.

Service Retirement Benefit

<u>Groups A, B, C and D:</u>

Normal Retirement Eligibility — Age 60 with 5 years of service or 30 years of service.

Early Retirement Eligibility — Age 55 with 25 years of service.

Benefit Formula Multiplier — Members hired prior to July 12, 1998 were given a one-time irrevocable option to choose either the benefit formula using a 2.22% multiplier or the benefit formula using a 2.50% multiplier. For members hired on or after July 12, 1998, benefits are calculated using a 2.50% multiplier.

Average Highest Compensation	Average of the highest three consecutive years of compensation.
Years of Service	Years or fractional years of full-time service rendered to the plan sponsor.
Benefit	a) An annuity which is actuarially equivalent to the accumulated contributions of the member at the time of retirement. b) A pension which together with the annuity produces a total annual retirement allowance equal to the product of the applicable benefit formula multiplier, the member's average highest compensation, and the number of years of service. Early Retirement Benefit is actuarially reduced from normal retirement age.

Group E:

Normal Retirement Eligibility	Age 60 with 5 years of service or 30 years of service.
Early Retirement Eligibility	Age 55 with 25 years of service.

Retirement benefit is composed of as many as three components:

Part A Benefit: for service earned through December 31, 2013

Part B Benefit: for service earned on and after January 1, 2014 up to a combined (Part A and B) 20 years of service

Part C Benefit: for service earned on or after January 1, 2014 in excess of a combined (Part A and B) 20 years of service.

Benefit Formula Multiplier	**Part A Benefit:** Members hired prior to July 12, 1998 were given a one-time irrevocable option to choose either the benefit formula using a 2.22% multiplier or the benefit formula using a 2.50% multiplier. For members hired on or after July 12, 1998, benefits are calculated using a 2.50% multiplier. **Part B Benefit:** Members hired prior to July 12, 1998 were given a one-time irrevocable option to choose either

the benefit formula using a 2.22% multiplier or the benefit formula using a 2.50% multiplier. For members hired on or after July 12, 1998, benefits are calculated using a 2.50% multiplier.

Part C Benefit: 2.20% multiplier

Average Highest Compensation — **Part A Benefit:** Average of the highest three consecutive years of compensation

Part B Benefit: Average of the highest five consecutive years of compensation

Part C Benefit: Average of the highest five consecutive years of compensation

Years of Service — Years or fractional years of full-time service rendered to the plan sponsor.

Benefit

a) An annuity which is actuarially equivalent to the accumulated contributions of the member at the time of retirement.

b) A pension which together with the annuity produces a total annual retirement allowance equal to the sum of Part A, Part B, and Part C benefits each of which is the product of the applicable benefit formula multiplier, the applicable average highest compensation, and the applicable number of years of service.

Early Retirement Benefit is actuarially reduced from normal retirement age.

Group F:

Normal Retirement Eligibility — Age 60 with 5 years of service or 30 years of service.

Early Retirement Eligibility — Age 55 with 25 years of service.

Retirement benefit is composed of as many as three components:

Part A Benefit: for service earned through June 30, 2011

	Part B Benefit: for service earned on and after July 1, 2011 up to a combined (Part A and B) 20 years of service
	Part C Benefit: for service earned on or after July 1, 2011 in excess of a combined (Part A and B) 20 years of service.
Benefit Formula Multiplier	**Part A Benefit:** Members hired prior to July 12, 1998 were given a one-time irrevocable option to choose either the benefit formula using a 2.22% multiplier or the benefit formula using a 2.50% multiplier. For members hired on or after July 12, 1998, benefits are calculated using a 2.50% multiplier.
	Part B Benefit: Members hired prior to July 12, 1998 were given a one-time irrevocable option to choose either the benefit formula using a 2.22% multiplier or the benefit formula using a 2.50% multiplier. For members hired on or after July 12, 1998, benefits are calculated using a 2.50% multiplier.
	Part C Benefit: 2.20% multiplier
Average Highest Compensation	**Part A Benefit:** Average of the highest three consecutive years of compensation
	Part B Benefit: Average of the highest five consecutive years of compensation
	Part C Benefit: Average of the highest five consecutive years of compensation
Years of Service	Years or fractional years of full-time service rendered to the plan sponsor.
Benefit	a) An annuity which is actuarially equivalent to the accumulated contributions of the member at the time of retirement. b) A pension which together with the annuity produces a total annual retirement allowance equal to the sum of Part A, Part B, and Part C benefits each of which is the product of the applicable benefit formula multiplier, the applicable average highest compensation, and the applicable number of years of service.

Early Retirement Benefit is actuarially reduced from normal retirement age.

Group G

Normal Retirement Eligibility	Age 67 with 5 years of service or age 62 with 30 years of service.
Early Retirement Eligibility	Age 57 with 15 years of service.
Benefit Formula Multiplier	Benefit is calculated using a 2.20% multiplier for all years of service up to 30 years and a 2.00% multiplier for all service in excess of 30 years.
Average Highest Compensation	Average of the highest five consecutive years of compensation.
Years of Service	Years or fractional years of full-time service rendered to the plan sponsor.
Benefit	a) An annuity which is actuarially equivalent to the accumulated contributions of the member at the time of retirement. b) A pension which together with the annuity produces a total annual retirement allowance equal to the product of the applicable benefit formula multiplier, the member's average highest compensation, and the number of years of service. Early Retirement Benefit is actuarially reduced from normal retirement age.

Miscellany for All Groups

In no event shall the retirement allowance be greater than 90% of a member's average highest compensation.

In no event shall the retirement allowance be greater than that permitted by Section 415 of the Internal Revenue Code.

The average highest compensation used in the calculation of benefits depends on which benefit formula applies to the member. The formula that uses the 2.22% multiplier includes overtime compensation and the lump sum payment for unused vacation, unused sick-pay, etc. The formulas that use all other multipliers do not include overtime or the lump sum payment.

Disability Retirement Benefit

Eligibility	5 years of service.
Benefit	90% of normal retirement benefit at disability date but not less than the smaller of: (1) 25% of average highest compensation (2) 90% of the retirement benefit member would have become entitled to had he continued in service to normal retirement age without further change in average highest compensation.

Deferred Vested Retirement Benefit

Eligibility	5 years of service.
Benefit	Normal retirement benefit beginning at normal retirement age.

Preretirement Death Benefit

(1) Refund of contributions with interest.

(2) Survivor Benefits according to type of survivors if member has at least 18 months of service.

Postretirement Death Benefit

(1) Lump sum $5,000 for group AB only.

(2) If no Joint and Survivor Option is selected, balance of member contributions not received back in retirement benefit payments prior to death.

Optional Forms of Benefit

(1) Joint and 100% Survivor Payment

(2) Joint and 50% Survivor Payment

(3) 66 2/3% Joint and Survivor Payment

(4) 80% Joint and Survivor Payment

COLA Increases

Group A and B:	3% simple COLA based on the participant's benefit on January 1, 2016 including all previously granted COLA's. Effective January 1, 2016 the COLA will be suspended for a 3-year period. In the third year of the COLA suspension (calendar year 2018), members will receive a one-time payment that is the lesser of 3% of their base pension benefit or $1,000. This payment will be made on January 1, or the anniversary date of the member's retirement according to when the member normally receives a COLA.
Group C, D, E, F, and G:	3% simple COLA based on initial gross monthly benefit with a 3-year delay following each participant's date of retirement.
Poverty Exception:	Any member of the Retirees Class or Current Employees Class who retired or retires with at least 5-years of service and whose household income is below 150% of federal poverty guidelines will receive a 3% compounding COLA until such time income exceeds 150% of federal poverty guidelines at which point the participant will receive a 3% simple COLA.

Contributions

By Members:	Each member, commencing January 1, 1978, contributes at a rate of 7.0% of the salary used to compute retirement benefits until his retirement. Beginning January 1, 2010, the employee contribution rate was increased 0.5% per year over 4 years to reach 9.0% of pay. The CSA establishes the contribution rate for members shall not exceed 9.0% of pay for the term of the agreement.
By Employers:	The sponsoring employer makes annual contributions based on members' salaries so that, when members become eligible for benefits, reserves will have been accumulated adequate to provide the pension and other benefits payable by the plan on account of creditable service.

Deferred Retirement Option Plan (DROP)

Eligibility	Current Employees Class members with at least 30 years of service.
Maximum Participation Period	5 years.
Minimum Participation Period	Participation in DROP for less than 2 years results in forfeiture of all interest earnings credited to the member's DROP account.
Benefit	Monthly pension benefit calculated as if eligible member actually retired on their DROP effective date, including any adjustments for an assigned optionee. The monthly pension benefit will be contributed to the member's DROP account in the CRS Pension Trust and paid out as a lump sum upon termination from the DROP.
Employee Contributions	Members continue to contribute 9% of pay while participating in DROP. A portion (75%) of the contribution is credited to the member's DROP account and the remaining portion (25%) of the contribution is paid to the CRS Pension Trust to offset the costs of administering the DROP.
Employer Contributions	Employer contributions to the CRS Pension Trust continue to apply in the same manner as for other actively employed members who are not participating in the DROP. Employer contributions are not credited to the member's DROP account.
Interest	DROP account balances are credited each month at a rate equal to the 10-year U.S. Treasury Note Business Day Series adjusted quarterly with a cap of 5% but not less than 0%.

APPENDIX C

STATEMENT OF ACTUARIAL ASSUMPTIONS AND METHODS

Actuarial assumptions and methods adopted by the Board March 1, 2018.

INVESTMENT RATE OF RETURN: 7.50% per year, net of investment expenses.

INFLATION ASSUMPTION: 2.75% per annum.

SALARY INCREASES: Salary increases are assumed to vary by service. Representative rates are as follows:

Service	Annual Increase
0	7.50%
5	5.00
10	4.50
15	4.00
21+	3.75

SEPARATIONS FROM ACTIVE SERVICE: For death rates, RP-2014 Employees Mortality Table with a generational approach using the MP-2017 projection scale was used. Representative values of the assumed annual rates of separation from active service are as follows:

	Annual Rate of Withdrawal			
Age	Less than One Year of Service	Between One and Three Years of Service	Between Three and Five Years of Service	Five or More Years of Service
20	22.00%	10.00%	8.00%	4.00%
25	22.00	10.00	8.00	4.00
30	22.00	10.00	8.00	4.00
35	22.00	10.00	4.00	4.00
40	22.00	10.00	4.00	2.75
45	22.00	10.00	4.00	1.25
50	22.00	10.00	4.00	1.25
55	22.00	10.00	4.00	1.25
60	22.00	10.00	4.00	1.25
65	22.00	10.00	4.00	1.25
70	22.00	10.00	4.00	1.25

Age	Annual Rate of Disability*
20	0.005%
25	0.010
30	0.015
35	0.025
40	0.045
45	0.075
50	0.135
55	0.210
60	0.250
65	0.250

* Rates are 0% when member is eligible for normal retirement

	Annual Rate of Retirement Groups C, E, and F*				
Age	5 Years of Service	6-24 Years of Service	25-29 Years of Service	30 Years of Service	31+ Years of Service
50				55.0	30.0
55			6.0%	55.0	30.0
56			8.0	55.0	30.0
57			10.0	55.0	30.0
58			10.0	55.0	30.0
59			10.0	55.0	30.0
60	25.0%	25.0%	25.0	55.0	25.0
61	25.0	18.0	18.0	55.0	25.0
62	25.0	18.0	18.0	55.0	25.0
63	25.0	18.0	18.0	55.0	25.0
64	25.0	18.0	18.0	55.0	25.0
65	25.0	18.0	18.0	55.0	25.0
70	100.0	100.0	100.0	100.0	100.0

* For purposes of valuing CSA Employee members eligible for DROP benefits, an additional 10% is added to rates for 30 years of service and an additional 5% is added to rates for 31+ years of service.

	Annual Rate of Retirement Group G				
Age	5 Years of Service	6-14 Years of Service	15-29 Years of Service	30 Years of Service	31+ Years of Service
57			6.0%	6.0%	6.0%
58			6.0	6.0	6.0
59			8.0	8.0	8.0
60			8.0	8.0	8.0
61			10.0	10.0	10.0
62			10.0	25.0	25.0
63			10.0	25.0	18.0
64			10.0	25.0	18.0
65			10.0	25.0	18.0
66			10.0	25.0	18.0
67	25.0%	25.0%	25.0	25.0	18.0
68	25.0	18.0	18.0	18.0	18.0
69	25.0	18.0	18.0	18.0	18.0
70	100.0	100.0	100.0	100.0	100.0

DEATHS AFTER RETIREMENT: The RP-2014 Mortality Table with a generational approach using the MP-2017 projection scale and set forward two years for both males and females is used for the period after retirement and for dependent beneficiaries. The RP-2014 Disabled Retiree Mortality Table with a generational approach using the MP-2017 projection scale is used for the period after disability.

EXPENSES: Estimated budgeted administrative expenses of 0.80% of payroll are added to the normal cost rate.

WITHDRAWAL ASSUMPTION: It is assumed that 60% of vested members who terminate elect to leave their contributions in the plan in order to be eligible for a benefit at their normal retirement date while the remaining 40% elect to withdraw their contributions.

PERCENT MARRIED: 80% of members are assumed to be married for the purposes of valuing pre-retirement survivor benefits.

SPOUSE AGE DIFFERENCE: Unless otherwise reported in the data, males are assumed to be three years older than his spouse.

ASSETS: Market Value of Assets

PART-TIME ACTIVE MEMBERS: All part-time active members are assumed to receive a refund of their employee contributions with interest upon leaving the System.

DROP PARTICIPATION: 60% of eligible CSA Employee members eligible for DROP benefits are assumed to decline participation and 40% are assumed to elect participation. Those electing to participate are assumed to remain in the DROP for 3 years.

DROP CREDITING RATE: 3.25% annually.

VALUATION METHOD: Entry age actuarial cost method.