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city of CINCINNATI RETIREMENT

Report of the Actuary on the Annual Valuation of the Retirement System for Employees of the City of Cincinnati

Pension Report

Prepared as of December 31, 2016 and Approved by the Board of Trustees on June 1, 2017

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June 1, 2017

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

Members of the Board:

We are pleased to submit the results of the pension actuarial valuation of the Retirement System for Employees of the City of Cincinnati (CRS) prepared as of December 31, 2016. The purpose of this report is to provide a summary of the funded status of the System as of December 31, 2016 and to recommend actuarially determined contribution rates. The information needed for the City under Governmental Accounting Standards Board Statements No. 67 and 68 (GASB 67 and 68) will be provided in a separate report. However, for informational purposes, we have also provided accounting information under GASB 25 and 27 in Section VI.

On the basis of the valuation, it is recommended that employer contributions to the System be set at a rate of 27.95% of payroll (approximately $48,046,000) for the City's fiscal year ending June 30, 2018. The benefits of the System are included in the calculated contribution rate which is developed using the entry age cost method. Five-year smoothed market value of plan assets is used for the actuarial value of assets. Gains and losses are reflected in the unfunded accrued liability that is being amortized by regular annual contributions within a 30-year period.

The valuation reflects the plan changes included in Ordinance 336-2016 adopted by the City Council on October 26, 2016. In addition, the Metropolitan Sewer District made a payment on March 11, 2016 of $8,723,061 effectively paying off the remaining balance of the Early Retirement Incentive Plan (ERIP) liability.

Per the Collaborative Settlement Agreement (CSA), the City contribution to CRS is expected to be 16.25% of payroll each year. Contributions at this level will never amortize the Unfunded Accrued Liability (UAL). However, members who began membership on or after January 1, 2010 are covered by a different benefit structure with a lower normal cost rate, so, as members who began membership prior to January 1, 2010 leave covered employment and are replaced by members in the lower cost benefit structure, the total normal cost rate is expected to decline. As a result, the portion of the 16.25% available to pay off the UAL is expected to increase each year in the future until all active members in the valuation are covered by the provision in the most recent benefit tier. While this is expected to improve the System's financial health in future years, it is impossible to anticipate the long-term funding progress without performing an open group projection of future valuation results. Such projections are performed to assist the Board in evaluating the long-term funding of the System, but the projections are completed after the valuation report is issued.

This is to certify that the independent consulting actuary is a Member of the American Academy of Actuaries and has experience in performing valuations for public retirement systems, that the valuation was prepared in accordance with principles of practice prescribed by the Actuarial Standards Board, and that the actuarial calculations were performed by qualified actuaries in accordance with accepted actuarial procedures, based on the current provisions of the System and on actuarial assumptions that are internally consistent and reasonably based on the actual experience of the System. While not verifying the data at source, the actuary performed tests for consistency and reasonability.

Future actuarial results may differ significantly from the current results presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Since the potential impact of such factors is outside the scope of a normal annual actuarial valuation, an analysis of the range of results is not presented herein.

The actuarial computations presented in this report are for purposes of determining the recommended funding amount for the System. Use of these computations for purposes other than meeting these requirements may not be appropriate.

We trust that the report will meet the approval of the Board and will furnish the desired information concerning the financial condition of the System.

Respectfully submitted,

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

Eric Gary, FSA, FCA, MAAA
Principal and Chief Health Actuary

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TABLE OF CONTENTS

RETIREMENT SYSTEM FOR EMPLOYEES OF THE CITY OF CINCINNATI
REPORT OF THE ACTUARY
ON THE VALUATION
PREPARED AS OF DECEMBER 31, 2016

PENSION REPORT

SECTION I – SUMMARY OF PRINCIPAL RESULTS

1. For convenience of reference, the principal results of the current and preceding valuations are summarized below.

Valuation Date	December 31, 2016	December 31, 2015
Active members:		
Number	3,020*	2,931
Annualized covered compensation	$ 171,899,952	$ 167,248,240
Retired members and beneficiaries receiving benefits:		
Number	4,272**	4,264
Annual allowances	$ 162,162,901	160,734,970
Number of members and beneficiaries entitled to deferred benefits	191	191
Assets:		
Market Value	$ 1,708,843,000	$ 1,670,524,000
Actuarial Value	1,732,053,076	1,703,002,075
Unfunded accrued liability	$ 520,821,984	$ 504,481,704
Amortization Period	30 years	30 years
Funded Ratio		
Market Value	75.9%	75.7%
Actuarial Value	76.9%	77.1%
City's Fiscal Year Ending	**June 30, 2018**	**June 30, 2017**
City actuarially determined contribution rate (ADC):		
Normal Cost	4.16%	3.85%
Unfunded Accrued Liability	23.79	23.30
Sub-total	27.95%	27.15%
ERIP***	0.00	0.77
Total	27.95%	27.92%
City estimated actuarially determined contribution in dollars (ADC):		
Normal Cost	$ 7,151,000	$ 6,439,000
Unfunded Accrued Liability	40,895,000	38,969,000
Sub-total	$ 48,046,000	$ 45,408,000
ERIP***	0	1,281,000
Total	$ 48,046,000	$ 46,689,000

*In addition, there are 992 part-time employees at December 31, 2016.

**Includes 49 members participating in the Deferred Retirement Option Plan (DROP) as of December 31, 2016.

***The Metropolitan Sewer District made a payment on March 11, 2016 of $8,723,061 effectively paying off the remaining balance of the Early Retirement Incentive Plan (ERIP) liability.

2. The major benefit and contribution provisions of the System as reflected in the valuation are summarized in Schedule G. The valuation reflects the plan changes included in 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.
3. Schedule E of this report outlines the full set of actuarial assumptions and methods used in the valuation.
4. Schedule C shows the development of the actuarial value of assets. The entry age actuarial cost method was used to prepare the valuation. Schedule F contains a brief description of the actuarial cost method.
5. Comments on the valuation results as of December 31, 2016 are given in Section IV, comments on the experience and actuarial gains and losses during the valuation year are given in Section VII and further discussion of the contributions is set out in Section V.
6. As shown in the Summary of Principal Results, the funding ratio is the ratio of assets to the accrued liability and is different based on market value of assets. The funded ratio is an indication of progress in funding the promised benefits. Since the ratio is less than 100%, there is a need for additional contributions toward payment of the unfunded accrued liability. In addition, this funded ratio does not have any relationship to measuring sufficiency if the plan had to settle its liabilities.

SECTION II – MEMBERSHIP DATA

1. Data regarding the membership of the System for use as a basis of the valuation were furnished by the System. The valuation included 3,020 active members with annualized compensation totaling $171,899,952. In addition, there are 992 part-time employees. The majority of these part-time employees are seasonal employees that have a minimal impact on the liabilities of the System.

2. The following table shows the number of retired members in receipt of a benefit and those members with a deferred benefit as of December 31, 2016 together with the amount of their annual retirement benefits payable under the System as of that date.

THE NUMBER AND ANNUAL BENEFITS OF RETIRED MEMBERS AND BENEFICIARIES AS OF DECEMBER 31, 2016

GROUP	NUMBER*	ANNUAL RETIREMENT BENEFITS
Participants Receiving Benefits**	4,272	$ 162,162,901
Participants with a Deferred Benefit	191	2,964,483
Total	4,463	$ 165,127,384

*In addition, there are 7,784 inactive participants who are former employees who have an employee account balance in the plan but are not otherwise vested in an employer provided benefit.

**Includes 49 members participating in the Deferred Retirement Option Plan (DROP) as of December 31, 2016.

3. Table 1 in Schedule H shows a reconciliation of participating members for the past plan year; Table 2 in Schedule H shows the distribution by age and years of membership service of the number of active members included in the valuation; and Table 3 shows the number and annual benefits of retired members and beneficiaries included in the valuation, distributed by age.

SECTION III – ASSETS

1. As of December 31, 2016, the total market value of assets amounted to $2,177,816,000, as reported by the System, of which $1,708,843,000 has been allocated for pension purposes. The estimated investment return for the plan year was 9.24%. Schedule D shows the receipts and disbursements of the System for the year preceding the valuation date and a reconciliation of the System balances at market value.
2. The market-related actuarial value of assets using a 5-year smoothing technique of investment gains and losses is $1,732,053,076. The estimated investment return for the plan year ending December 31, 2016 on an actuarial value of assets basis was 8.50%, which can be compared to the investment return assumed for the period of 7.50%. Schedule C shows the development of the actuarial value of assets as of December 31, 2016.

SECTION IV – COMMENTS ON VALUATION

1. Schedule B of this report contains the valuation balance sheet which shows the present and prospective assets and liabilities of the System as of December 31, 2016. The valuation was prepared in accordance with the actuarial assumptions set forth in Schedule E and the actuarial cost method which is described in Schedule F.
2. The valuation balance sheet shows that the System has total prospective liabilities of $2,434,121,933, of which $1,695,810,628 is for the prospective benefits payable on account of present retired members, beneficiaries of deceased members, and terminated members entitled to deferred benefits, and $738,311,305 is for the prospective benefits payable on account of present active members. Against these liabilities, the System has a total present actuarial value of assets of $1,732,053,076 as of December 31, 2016. The difference of $702,068,857 between the total liabilities and the total present assets represents the present value of future contributions.
3. The contributions to the System consist of normal contributions and accrued liability contributions. The normal cost rate is equal to the actuarial present value of benefits accruing during the current

year divided by the annual active members' payroll. Estimated budgeted administrative expenses are included in the normal cost rate. The expenses for the fiscal year ending June 30, 2018 are estimated to be 0.75% of payroll. The valuation indicates that normal contributions at the rate of 13.16% of payroll are required under the entry age method. Of this amount, 9.00% will be paid by the members and the remaining 4.16% is payable by the City.

4. Prospective normal contributions at the rate of 13.16% have a present value of $181,246,873 net of administrative expenses. When this amount is subtracted from $702,068,857, which is the present value of the total future contributions to be made, there remains $520,821,984 as the amount of unfunded accrued liability contributions. The development of the unfunded accrued liability is shown in Schedule A.

5. As can be seen from Schedule I of our report, the System had a total actuarial loss of about $12.8 million for the year. There was a $27.8 million loss from non-recurring items including the changes from Ordinance 336 and programming changes. As for the actuarial experience of CRS for the valuation year, there was about a $15.0 million gain. This was mainly due to gains from a higher than expected return on investments for the year as well as more deaths than expected. These gains were partially offset by losses from retirement and withdrawal experience during the year.

SECTION V – CONTRIBUTIONS PAYABLE

1. The contributions consist of a normal contribution and an accrued liability contribution as determined by actuarial valuation.

2. The normal contribution rate is calculated as the level percentage of payroll which, if applied for the average new member during the entire period of his anticipated covered service, would be required to meet the cost of all benefits payable on his behalf. On the basis of the valuation, the normal contribution rate was determined to be 13.16%. Of this amount, 9.00% will be paid by the members and the remaining 4.16% is payable by the City.

3. A contribution of 23.79% of payroll will liquidate the portion of the unfunded accrued liability within a 30-year period.

4. The total contribution rate required for the City's fiscal year ending June 30, 2018 is, therefore, 27.95% of payroll.

5. The following table summarizes the employer contributions which were determined by the December 31, 2016 valuation and are recommended for use.

CITY ACTUARIALLY DETERMINED CONTRIBUTIONS (ADC)
FOR CITY FISCAL YEAR ENDING JUNE 30, 2018

	PERCENTAGE OF ACTIVE MEMBERS' COMPENSATION	EMPLOYER ACTUARIALLY DETERMINED CONTRIBUTION (ADC)
Normal Cost	4.16%	$ 7,151,000
Unfunded Accrued Liability	23.79	40,895,000
Total	27.95%	$ 48,046,000

SECTION VI – ACCOUNTING INFORMATION

Governmental Accounting Standards Board Statements (GASB) has issued Statements No. 67 and 68 which replaces Statement No. 25 and 27 for plan years beginning after June 15, 2013. The information required under the new GASB Statements will be issued in separate reports. The following information is provided for informational purposes only.

1. The following is a distribution of the number of employees by type of membership:

NUMBER OF ACTIVE AND RETIRED PARTICIPANTS AS OF DECEMBER 31, 2016

GROUP	TOTAL
Retired participants and beneficiaries currently receiving benefits*	4,272
Terminated participants and beneficiaries entitled to benefits but not yet receiving benefits	191
Inactive participants**	7,784
Active Participants	
Full-Time	3,020
Part-Time	992
Total	16,259

* Includes 49 members participating in the Deferred Retirement Option Plan (DROP) as of December 31, 2016.

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

2. The schedule of funding progress as shown below.

SCHEDULE OF FUNDING PROGRESS
Dollar Amounts in Thousands

Actuarial Valuation Date	Actuarial Value of Assets (a)	Accrued Liability (AL) Entry Age (b)	Unfunded AL (UAL) (b – a)	Funded Ratio (a / b)	Covered Payroll (c)	UAL as a Percentage of Covered Payroll ((b – a) / c)
12/31/2011	$1,466,077	$2,194,505	$728,428	66.8%	$165,029	441.4%
12/31/2012	1,367,695	2,229,818	862,123	61.3	167,148	515.8
12/31/2013	1,424,933	2,254,121	829,188	63.2	163,477	507.2
12/31/2014	1,453,922	2,259,822	805,900	64.3	164,575	489.7
12/31/2015	1,703,002	2,207,484	504,482	77.1	174,963	288.3
12/31/2016	1,732,053	2,252,875	520,822	76.9	179,463*	290.2

*Includes $7,563,247 in part-time active employee compensation.

3. Additional information as of December 31, 2016 follows:

Valuation date	12/31/2016
Actuarial cost method	Entry age
Amortization period	Level dollar open
Remaining amortization period	30 years
Asset valuation method	Five-year smoothed market value
Actuarial assumptions:	
Investment rate of return (includes inflation)	7.50%
Projected salary increases (includes inflation)	4.00% - 7.50%
Inflation	3.00%
Cost-of-living adjustments	3.00%

SECTION VII – EXPERIENCE

Actual experience will never (except by coincidence) coincide exactly with assumed experience. It is assumed that gains and losses will be in balance over a period of years, but sizable year to year fluctuations are common. Detail on the derivation of the experience gain/(loss) for the year ended December 31, 2016 is shown below.

			$ Thousands
(1)	UAL* as of December 31, 2015	$	504,482
(2)	Total normal cost from December 31, 2015 valuation		21,491
(3)	Total actual contributions		54,526
(4)	Interest accrual: [(1) x 0.075] – {[(2) – (3)] x 0.0375}		36,597
(5)	Expected UAL before changes: (1) + (2) – (3) + (4)	$	508,044
(6)	Change due to plan amendments		27,754
(7)	Change due to actuarial assumptions or methods		0
(8)	Expected UAL after changes: (5) + (6) + (7)	$	535,798
(9)	Actual UAL as of December 31, 2016	$	520,822
(10)	Gain/(loss): (8) – (9)	$	14,976
(11)	Gain/(loss) as percent of accrued liabilities at start of year ($2,207,484)		0.7%

*Unfunded accrued liability, prior to the restatement of the actuarial value of assets.

Valuation Date December 31	Actuarial Gain/(Loss) as a % of Beginning Accrued Liabilities
2012	(5.0)%
2013	2.8%
2014	2.3%
2015	(0.0)%
2016	0.7%

SCHEDULE A

DEVELOPMENT OF THE UNFUNDED ACCRUED LIABILITY

	December 31, 2016	December 31, 2015
(1) Present value of prospective benefits:		
(a) Present active full time members	$ 734,274,020	$ 720,332,136
(b) Present active part time and seasonal members	4,037,285	3,993,343
(c) Present retired members, beneficiaries, former members entitled to deferred vested benefits and inactive members	1,695,810,628	1,647,154,186
(d) Total	$ 2,434,121,933	$ 2,371,479,665
(2) Present value of future normal contributions	181,246,873	163,995,886
(3) Actuarial accrued liabilities: 1(d) – (2)	$ 2,252,875,060	$ 2,207,483,779
(4) Actuarial value of assets	1,732,053,076	1,703,002,075
(5) Unfunded accrued liability (UAL): (3) – (4)	$ 520,821,984	$ 504,481,704
(6) Actuarially Determined Contribution Rate as a % of Payroll		
(a) Normal Cost	4.16%	3.85%
(b) UAL	23.79%	23.30%
(c) Sub-Total	27.95%	27.15%
(d) ERIP	0.00%	0.77%
(e) Total	27.95%	27.92%
(7) Estimated Contribution in dollars		
(a) Normal Cost	$ 7,151,000	$ 6,439,000
(b) UAL	40,895,000	38,969,000
(c) Sub-Total	$ 48,046,000	$ 45,408,000
(d) ERIP	0	1,281,000
(e) Total	$ 48,046,000	$ 46,689,000

SCHEDULE B

VALUATION BALANCE SHEET

Present and prospective assets and liabilities as of December 31, 2016:

ACTUARIAL LIABILITIES		
Present value of prospective benefits payable on account of present retired members, beneficiaries of deceased members, terminated members entitled to deferred benefits and inactive members		$1,695,810,628
Present value of prospective benefits payable on account of present active members		738,311,305
Total liabilities		$2,434,121,933
PRESENT AND PROSPECTIVE ASSETS		
Actuarial value of assets		$1,732,053,076
Present value of future contributions		
City and Member Normal contributions	$ 181,246,873	
Unfunded accrued liability contributions	520,821,984	
Total prospective contributions		$ 702,068,857
Total assets		$2,434,121,933

SCHEDULE C

DEVELOPMENT OF THE ACTUARIAL VALUE OF ASSETS

(1)	Actuarial Value of Assets as of December 31, 2015		$ 1,703,002,075
(2)	Market Value of Assets as of December 31, 2016		$ 1,708,843,000
(3)	Market Value of Assets as of December 31, 2015		$ 1,670,524,000
(4)	Net Cash Flow During Plan Year		
	(a)	Contributions	$ 54,526,000
	(b)	Benefit Payments and Net Transfers	163,812,000
	(c)	Administrative Expenses	1,629,000
	(d)	Investment Expenses	8,390,000
	(e)	Net Cash Flow: (a) + (b) + (c) + (d)	$ (119,305,000)
(5)	Investment Income		
	(a)	Market Total: (2) – (3) – (4)(e)	$ 157,624,000
	(b)	Assumed Rate	7.50%
	(c)	Amount for Immediate Recognition	
	[(3) x (5)(b)] + [[(4)(a) + (4)(b) + (4)(c)] x (5)(b) x 0.5] - (4)(d)		$ 129,519,988
	(d)	Amount for Phased-In Recognition: (5)(a) – (5)(c)	$ 28,104,012
(6)	Recognized Amounts for Plan Year		
	(a)	Current Year: 0.20 x (5)(d)	$ 5,620,802
	(b)	First Prior Year	(22,563,358)
	(c)	Second Prior Year	(1,887,920)
	(d)	Third Prior Year	25,772,630
	(e)	Fourth Prior Year	11,893,859
	(f)	Total Recognized Investment Gain/(Loss)	$ 18,836,013
(7)	Actuarial Value of Assets as of December 31, 2016		
	(1) + (4)(e) + (5)(c) + (6)(f)		$ 1,732,053,076
		80% of Market Value EOY	1,367,074,400
		120% of Market Value EOY	2,050,611,600
(8)	Final Actuarial Value of Assets as of December 31, 2016		$ 1,732,053,076
(9)	Rate of Return on Actuarial Value		8.50%

SCHEDULE D

CURRENT ASSET INFORMATION

Receipts		
(1) Contributions		$ 54,526,000
(2) Investment Income		
• Net Appreciation (Depreciation) in Fair Value of Investments	$ 130,437,000	
• Dividends	22,649,000	
• Interest	3,609,000	
• Miscellaneous Income	929,000	
• Investment Expenses	(8,390,000)	
Total Investment Income		$ 149,234,000
(3) Total Receipts		$ 203,760,000
Disbursements		
(4) Benefits Paid	$ 163,254,000	
(5) Administrative Expenses	1,629,000	
(6) Net Transfers	558,000	
(7) Total Disbursements		$ 165,441,000
(8) Excess of Receipts Over Disbursements: (3) - (6)		$ 38,319,000
Reconciliation of Asset Balances		
(9) Market Value at December 31, 2015		$1,670,524,000
(10)Excess of Receipts Over Disbursements		38,319,000
(11)Market Value at December 31, 2016		$1,708,843,000
(12)Estimated Rate of Return on Market Value of Assets		9.24%

HISTORICAL ASSET INFORMATION
($ in thousands)

Valuation Date	Actuarial Value of Assets		Market Value of Assets	
	Amount	Rate of Return	Amount	Rate of Return
12/31/2011	$1,466,077	0.24%	$1,353,822	0.88%
12/31/2012	1,367,695	0.25	1,409,032	12.06
12/31/2013	1,424,933	12.11	1,537,511	16.99
12/31/2014	1,453,922	10.18	1,522,851	6.46
12/31/2015	1,703,002	7.51	1,670,524	(0.11)
12/31/2016	1,732,053	8.50	1,708,843	9.24

SCHEDULE E

OUTLINE OF ACTUARIAL ASSUMPTIONS AND METHODS

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

INFLATION ASSUMPTION: 3.00% per annum.

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

Service	Annual Increase
0	7.5%
5	5.0
10	4.5
20	4.5
30	4.0

SEPARATIONS FROM ACTIVE SERVICE: For death rates, RP-2000 Combined Mortality Table set forward two years for males and set forward one year for females and using a Scale AA projection to 2020 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	25.0%	10.0%	7.5%	5.0%
25	25.0	10.0	7.5	5.0
30	25.0	10.0	7.5	3.5
35	25.0	10.0	4.0	2.8
40	25.0	10.0	4.0	2.3
45	25.0	10.0	4.0	1.5
50	25.0	10.0	4.0	1.5
55	25.0	10.0	4.0	1.5
60	25.0	10.0	4.0	1.5
65	25.0	10.0	4.0	1.5
70	25.0	10.0	4.0	1.5

	Annual Rate of Disability	
Age	Groups C, D, E, and F	Group G
20	0.01%	0.01%
25	0.02	0.02
30	0.03	0.03
35	0.05	0.05
40	0.09	0.09
45	0.15	0.15
50	0.27	0.27
55	0.42	0.42
60	0.00	0.50
67	0.00	0.00

Age	Early Retirement	Less than 30 Years of Service	30 Years of Service	31+ Years of Service
		Annual Rate of Retirement		
		Groups C, D, E, and F*		
50			45.0	30.0
55	10.0%		45.0	30.0
59	10.0		45.0	30.0
60		25.0%	30.0	25.0
61		20.0	20.0	20.0
65		20.0	20.0	20.0
70		100.0	100.0	100.0
		Group G		
57	10.0%			
60	20.0			
62	20.0		25.0%	20.0%
65	20.0		25.0	20.0
67		25.0%	25.0	20.0
69		20.0	20.0	20.0
70		100.0	100.0	100.0

* For purposes of valuing CSA Employee members eligible for DROP benefits, the rates listed for 30 or more years of service are adjusted as follows:

- 30% of members who are expected to retire with 31, 32, 33, 34, or 35 years of service are assumed to enter the DROP upon attaining 30 year of service.
- 10% of members who are expected to retire with 30 years of service are assumed to enter the DROP upon attaining 30 years of service.

DEATHS AFTER RETIREMENT: The RP-2000 Combined Mortality Table set forward two years for males and set forward one year for females and using a Scale AA projection to 2020 is used for the period after retirement and for dependent beneficiaries. The RP-2000 Disabled Mortality Table (set back 5 years for females) is used for the period after disability.

EXPENSES: Estimated budgeted administrative expenses of 0.75% of payroll are added to the normal cost rate.

PERCENT MARRIED: 70% of male members and 30% of female members are assumed to be married with the male three years older than his spouse.

ASSETS: Actuarial value, as developed in Schedule C. The actuarial value of assets recognizes a portion of the difference between the market value of assets and the expected market value of assets, based on the assumed valuation rate of return. The amount recognized each year is 20% of the difference between market value and expected market value. In addition, the actuarial value of assets cannot be less than 80% or more than 120% of the market value of assets.

WITHDRAWAL ASSUMPTION: It is assumed that 100% of vested members who terminate with less than 15 years of service elect to withdraw their contributions and that 50% of vested members who terminate with 15 or more years of service elect to withdraw their contributions while the remaining 50% elect to leave their contributions in the plan in order to be eligible for a benefit at their retirement date.

DROP CREDITING RATE: 3.25% annually.

VALUATION METHOD: Entry age actuarial cost method. See Schedule F for a brief description of this method.

SCHEDULE F

ACTUARIAL COST METHOD

1. The valuation is prepared on the projected benefit basis, under which the present value, at the interest rate assumed to be earned in the future (currently 7.50%), of each member's expected benefits at retirement or death is determined, based on age, service and sex. The calculations take into account the probability of a member's death or termination of employment prior to becoming eligible for a benefit, as well as the possibility of his terminating with a service, disability or survivor's benefit. The present value of the expected benefits payable on account of the active members is added to the present value of the expected future payments to retired members and beneficiaries to obtain the present value of all expected benefits payable from the System on account of the present group of members and beneficiaries.
2. The employer contributions required to support the benefits of the System are determined following a level funding approach, and consist of a normal contribution and an accrued liability contribution.
3. The normal contribution is determined using the entry age actuarial cost method. Under this method, a calculation is made to determine the level percentage of payroll which, if applied for the average new member during the entire period of his anticipated covered service, would be required in addition to the contributions of the member to meet the cost of all benefits payable on his behalf.
4. The unfunded accrued liability is determined by subtracting the present value of prospective employer normal contributions and member contributions, together with the current actuarial value of assets held, from the present value of expected benefits to be paid from the System.

SCHEDULE G

SUMMARY OF MAIN SYSTEM PROVISIONS AS INTERPRETED FOR VALUATION PURPOSES

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 (Non-CSA participants)	Group G members and their designated optionees; or Inactive members not assigned to a group because they were neither employed nor vested on 7/1/2011.

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.

2007 Early Retirement Window — City employees who have 28 years or more of service credit prior to January 1, 2008 were eligible. Those electing to retire prior to January 1, 2008 were credited with two more years of 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%.

SCHEDULE H

TABLE 1

STATUS RECONCILIATION OF PARTICIPATING MEMBERS

	Active Full Time	Active Part Time	Receiving Benefits*	Deferred Benefits	Total
Participants as of December 31, 2015	2,931	979	4,264	191	8,365
A. Receiving Benefits	(151)	(3)	169	(15)	
B. Terminated Vested	(25)	(3)		28	
C. Terminated Non-Vested	(45)	(236)			(281)
D. Deaths	(7)	(2)	(192)		(201)
E. Rehires	9	8		(4)	13
F. New Participants	296	352			648
G. New Member Due to Death of Participant			31		31
H. Part Time to Full Time	71	(71)			
I. Full Time to Part Time	(25)	25			
J. Refunds	(34)	(57)		(8)	(99)
K. Benefits Expired			(1)	(1)	(2)
L. Data Corrections			1		1
Participants as of December 31, 2016	3,020	992	4,272	191	8,475

*Includes 49 members participating in the Deferred Retirement Option Plan (DROP) as of December 31, 2016.

In addition, there are 7,784 inactive participants who are former employees who have an employee account balance in the plan but are not otherwise vested in an employer provided benefit.

SCHEDULE H
(Continued)

TABLE 2

SCHEDULE OF ACTIVE MEMBERS BY AGE AND SERVICE
AS OF DECEMBER 31, 2016

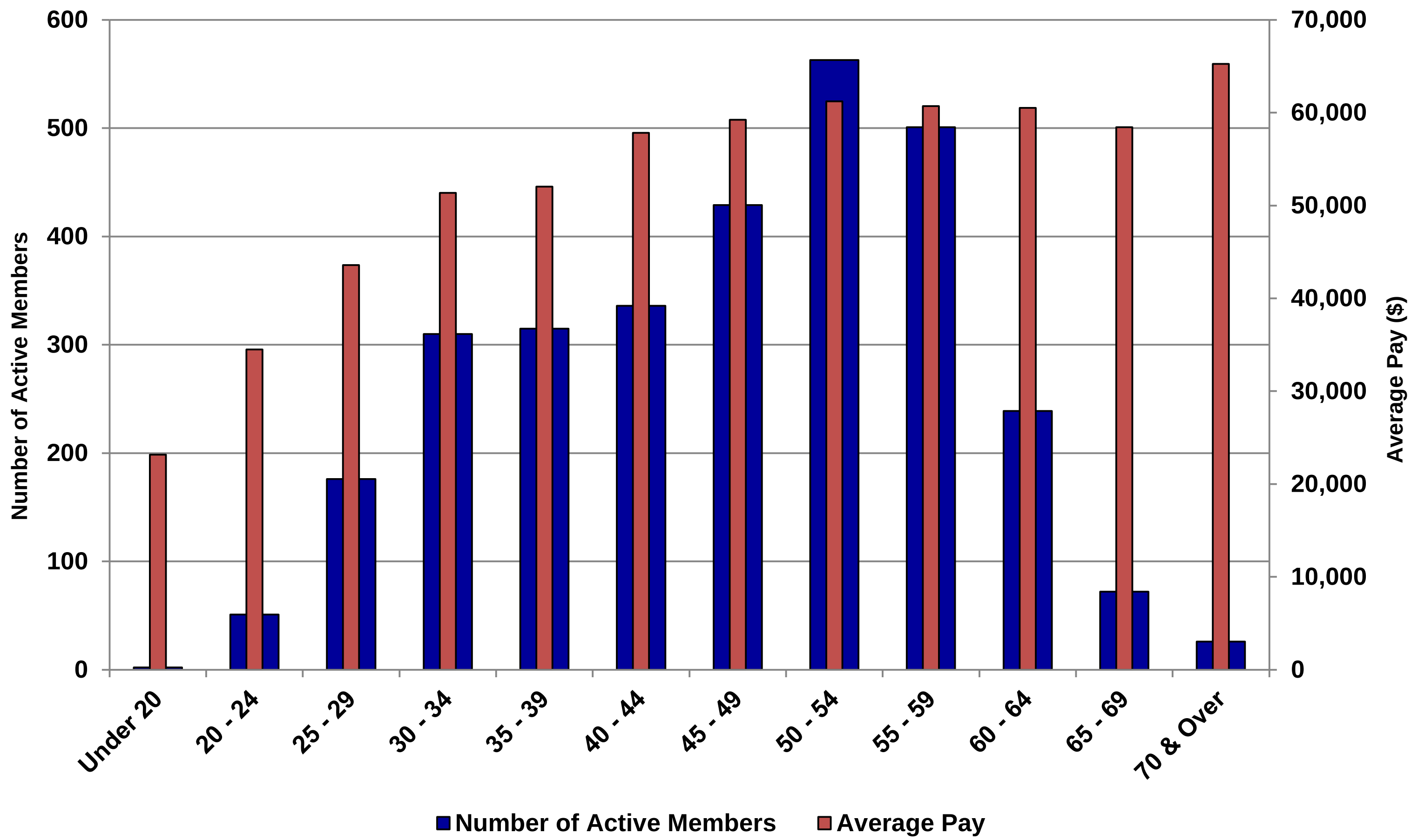
	Completed Years of Service							
Age	0 – 4	5 – 9	10 – 14	15 – 19	20 – 24	25 – 29	30+	Total
Under 20	2							2
Avg Pay	23,157							23,157
20 - 24	50	1						51
Avg Pay	34,131	52,570						34,493
25 - 29	145	29	2					176
Avg Pay	42,675	47,528	53,569					43,599
30 - 34	176	103	29	2				310
Avg Pay	50,356	53,118	51,146	53,533				51,368
35 - 39	141	92	50	32				315
Avg Pay	48,468	55,437	53,128	56,179				52,026
40 - 44	108	81	67	58	22			336
Avg Pay	49,467	61,810	60,254	64,369	59,875			57,848
45 - 49	66	78	81	82	58	64		429
Avg Pay	53,580	58,355	58,447	59,733	62,178	63,929		59,250
50 - 54	73	56	46	76	80	206	26	563
Avg Pay	58,389	55,871	52,773	57,537	63,494	65,225	67,520	61,213
55 - 59	45	44	48	68	59	187	50	501
Avg Pay	52,215	62,439	59,164	54,830	58,661	64,694	63,980	60,725
60 - 64	30	26	29	29	36	68	21	239
Avg Pay	54,812	61,403	62,438	55,588	57,852	61,984	71,515	60,514
65 - 69	4	9	13	17	9	13	7	72
Avg Pay	87,333	63,247	48,814	63,894	54,918	49,754	61,140	58,450
70 & Over	3	1	5	3	4	6	4	26
Avg Pay	122,127	41,776	72,337	45,682	51,793	54,043	64,554	65,251
Total	843	520	370	367	268	544	108	3,020
Avg Pay	49,215	57,008	57,006	58,509	60,628	63,992	66,135	56,921

Average Age 46.74 Average Service 13.18

SCHEDULE H
(Continued)

CHART 1

DISTRIBUTION OF ACTIVE MEMBERS BY AGE
AS OF DECEMBER 31, 2016



SCHEDULE H
(Continued)

TABLE 3

SCHEDULE OF RETIRED MEMBERS AND BENEFICIARIES
AS OF DECEMBER 31, 2016

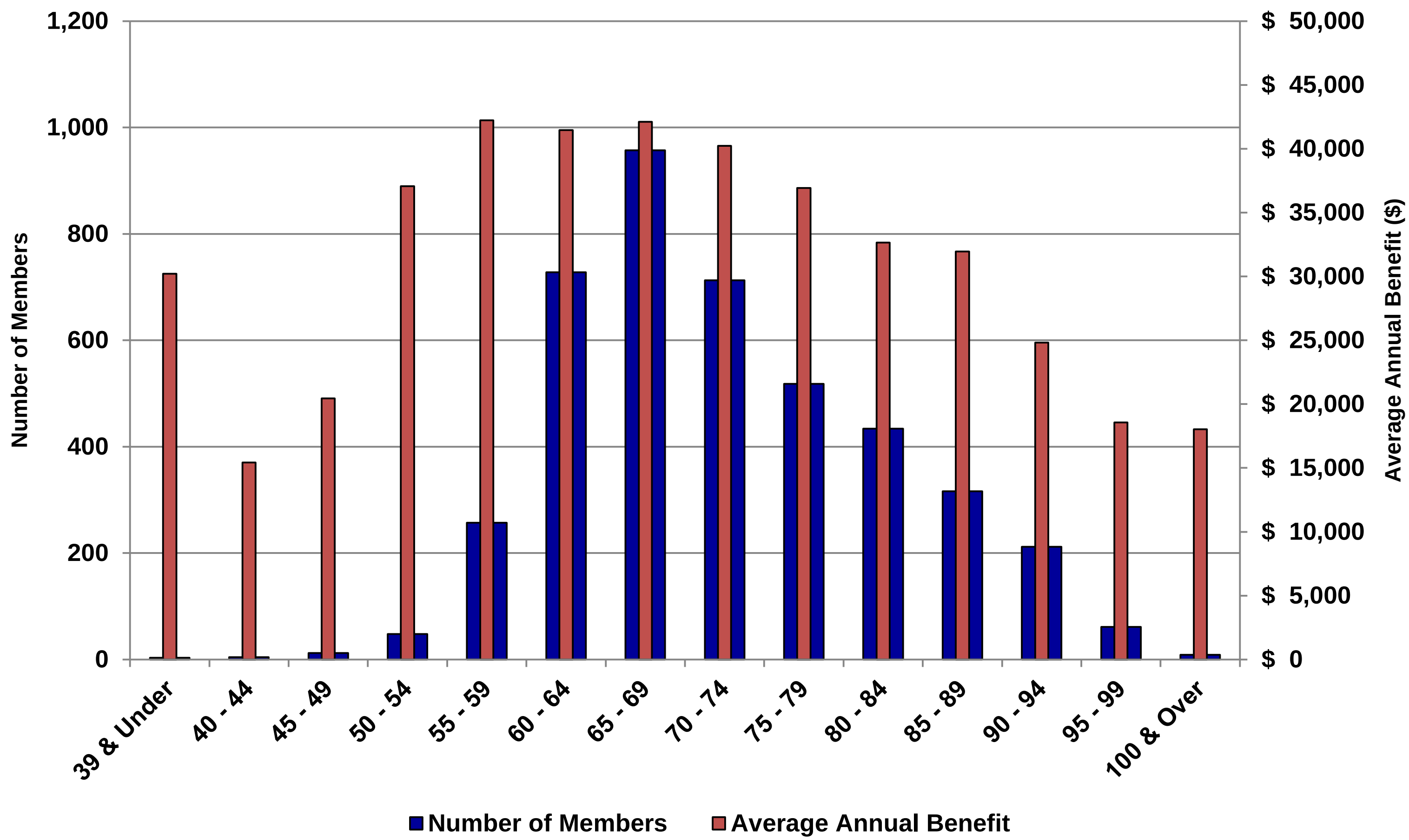
Attained Age	Number of Members	Total Annual Benefits	Average Annual Benefit
39 & Under	3	$ 90,625	$ 30,208
40 - 44	4	61,720	15,430
45 - 49	12	245,328	20,444
50 - 54	48	1,779,369	37,070
55 - 59	257	10,855,329	42,239
60 - 64	728	30,183,476	41,461
65 - 69	957	40,305,757	42,117
70 - 74	713	28,682,768	40,228
75 - 79	518	19,133,196	36,937
80 - 84	434	14,167,818	32,645
85 - 89	316	10,101,743	31,968
90 - 94	212	5,260,329	24,813
95 - 99	61	1,133,153	18,576
100 & Over	9	162,290	18,032
Total	**4,272**	**$ 162,162,901**	**$ 37,959**

In addition, there are 191 deferred vested employees and beneficiaries entitled to deferred annual benefits totaling $2,964,483.

SCHEDULE H
(Continued)

CHART 2

DISTRIBUTION OF RETIRED MEMBERS AND BENEFICIARIES
AS OF DECEMBER 31, 2016



SCHEDULE I

ANALYSIS OF FINANCIAL EXPERIENCE

Gains & Losses in Unfunded Accrued Liabilities
Resulting from Difference Between
Assumed Experience & Actual Experience
($ Thousands)

Type of Activity	$ Gain (or Loss) For Year Ending 12/31/2016	$ Gain (or Loss) For Year Ending 12/31/2015
Age & Service Retirements. If members retire at older ages, there is a gain. If younger ages, a loss.	$ (2,687)	$ (8,033)
Disability Retirements. If disability claims are less than assumed, there is a gain. If more claims, a loss.	(365)	137
Death-in-Service Benefits. If survivor claims are less than assumed, there is a gain. If more claims, there is a loss.	655	(109)
Withdrawal From Employment. If more liabilities are released by withdrawals than assumed, there is a gain. If smaller releases, a loss.	(3,302)	(2,125)
Pay Increases. If there are smaller pay increases than assumed, there is a gain. If greater increases, a loss.	(638)	3,347
New Members. Additional unfunded accrued liability will produce a loss.	(859)	(732)
Investment Income. If there is a greater investment income than assumed, there is a gain. If less income, a loss.	16,400	413
Death After Retirement. If retirants live longer than assumed, there is a loss. If not as long, a gain.	6,179	9,006
Other. Miscellaneous gains and losses resulting from changes in valuation software, data adjustments, timing of financial transactions, etc.	(407)	(2,268)
Gain (or Loss) During Year From Experience	$ 14,976	$ (364)
Non-Recurring Items. Adjustments for plan amendments, asset transfers, assumption changes, or method changes.	(27,754)	345,573
Composite Gain (or Loss) During Year	$ (12,778)	$ 345,209