

City of Phoenix Employees' Retirement System

ACTUARIAL VALUATION REPORT AS OF
June 30, 2017



October 16, 2017

Mr. Scott A. Miller
Retirement Program Administrator
City of Phoenix Employees' Retirement System
200 W. Washington Street, 10th Floor
Phoenix, Arizona 85003

Re: Actuarial Valuation of the City of Phoenix Employees' Retirement System as of June 30, 2017

Dear Scott:

We are pleased to present the Report on the actuarial valuation of the City of Phoenix Employees' Retirement System ("COPERS") as of June 30, 2017.

This Report presents the results of the June 30, 2017 actuarial valuation of COPERS. The Report describes the current actuarial condition of COPERS, determines required annual employer contribution rates, and analyzes changes in these required rates. In addition, the Report provides various summaries of the data. This report should not be relied on for any purpose other than the purpose described in the primary communication. Accounting information for purposes of complying with Governmental Accounting Standards Board (GASB) Statements Nos. 67 and 68 is provided in a separate report.

We certify that the information included herein and contained in the June 30, 2017 Actuarial Valuation Report is accurate and fairly presents the actuarial position of COPERS as of the valuation date.

Financing Objectives

The Actuarially Determined Contribution is determined by taking the sum of the normal cost, a component to amortize the unfunded liability and a component to cover administrative expenses. The Board's current funding policy is to contribute an amount each year based on the most recently calculated Actuarially Determined Contribution.

The unfunded accrued liability is comprised of experience gains and losses, assumption changes and benefit changes. A base is established in each year for changes in the unfunded accrued liability arising from these sources. In September 2013, the Board adopted amortization payment methods that amortize the pre-assumption changes of July 1, 2013 over a closed 25-year period as a level percentage of payroll; amortizes the assumption change liability as of July 1, 2013 over a closed 25-year period as a level percentage of payroll with a four-year phase in, and amortizes future gains and losses over a closed 20 year period. Future gains cannot be amortized over a period shorter than the period remaining on the 25-year amortization schedule. The actuarially determined contribution has increased from 37.16% of pay to 37.99% of pay. The increase is primarily due to the decrease in the assumed rate of return from 7.50% to 7.25% and a return on the actuarial value of assets that was lower than assumed.

Assuming all actuarial assumptions are met, this method of payment of the unfunded liability will result in full funding in 21 years. Actual results can and almost certainly will differ, as actual experience deviates from the assumptions. A schedule of each year's initial base and remaining outstanding balance is illustrated in Exhibit B.5.

Progress Toward Realization of Financing Objectives

The unfunded actuarial accrued liability and the funded ratio (ratio of the actuarial value of assets to the actuarial accrued liability) illustrate the progress toward the realization of certain financing objectives.

Based on the actuarial valuation as of June 30, 2017, COPERS has an unfunded liability of \$1,726.7 million and a funded ratio of 58.2%.

Although there were losses on both the accrued liabilities and the actuarial value of assets, the funded ratio on an actuarial value of assets basis increased from 57.3% to 58.2%. The funded ratio on a market value of assets basis increased from 54.0% to 57.0%. This increase was due primarily to the strong returns on the market value of assets. A funded ratio less than 100% indicates an annual required contribution that will require a normal cost and an amortization payment. If the contributions equal the ARC, and if all assumptions are met, the funded ratio should improve over time.

Benefit Provisions

All of the benefit provisions reflected in this valuation are those which were in effect on June 30, 2017. The benefit provisions are summarized in Section D of this Report.

Assumptions and Methods

The assumptions were adopted by the City of Phoenix Employees' Retirement System primarily upon the prior actuary's analysis. The most recent experience study had covered the period of July 1, 2009 through June 30, 2014. The new assumptions were adopted in August of 2015. Updated mortality assumptions were adopted in October of 2015. In 2017 the Board accepted GRS's recommendation in the economic assumption analysis and directed GRS to use a 7.25% discount rate, a 2.50% inflation assumption and a 3.0% payroll growth assumption. These assumptions and methods are detailed in Section F of this Report. The Board has sole authority to determine the actuarial assumptions used for COPERS. In our opinion, the actuarial assumptions used are reasonable.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as: 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 COPERS's funded status); and changes in plan provisions or applicable law. The actuarial calculations presented in this report are intended to provide



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information for rational decision making.

Data

The valuation was based upon information as of June 30, 2017, furnished by City of Phoenix Employees' Retirement System staff, concerning Plan benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal and year-to-year consistency, but did not otherwise audit the data. We are not responsible for the accuracy or completeness of the information provided by City of Phoenix Employees' Retirement System staff.

Certification

All of our work conforms with generally accepted actuarial principles and practices, and to the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion, our calculations also comply with the requirements of, where applicable, the Internal Revenue Code, and ERISA.

The signing actuaries are independent of COPERS sponsor. Leslie Thompson is an Enrolled Actuary. All signing actuaries are Members of the American Academy of Actuaries, and meet the Qualification Standards of the American Academy of Actuaries. Finally, all of the undersigned are experienced in performing valuations for large public retirement systems.

Respectfully submitted,

Gabriel, Roeder, Smith & Company



Leslie Thompson, FSA, FCA, EA, MAAA
Senior Consultant



Paul Wood, ASA, FCA, MAAA
Consultant



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SECTION A

EXECUTIVE SUMMARY

Actuarial Valuation

Valuations are prepared annually, as of June 30 of each year. The primary purposes of the valuation report are to measure the plan's liabilities, to determine the required contribution rate and to analyze changes in the City of Phoenix Employees' Retirement System actuarial position.

In addition, the report provides summaries of the member data, financial data, plan provisions, and actuarial assumptions and methods.

Financing Objectives

The employer contributions are intended to be sufficient to pay the normal cost and administrative expenses and to amortize the Unfunded Actuarial Accrued Liability (UAAL) as described on page B-5 of this report.

The contribution rate shown on page B-4 may be considered as a minimum contribution rate that complies with the Board's funding policy. Users of this report should be aware that contributions made at that rate do not guarantee benefit security. Given the importance of benefit security to any retirement system, we suggest that contributions to COPERS in excess of those presented in this report be considered.

The contribution rate in this report is determined using the actuarial assumptions and methods disclosed in Section F of this report. This report does not include a more robust assessment of the risks of future experience not meeting the actuarial assumptions. Assessment of risks was outside the scope of this assignment. We encourage a review and assessment of investment and other significant risks that may have a material effect on the plan's financial condition.

Assumption Changes

The Board approved the recommendation to use a 7.25% discount rate, an inflation rate of 2.50% , a payroll growth assumption of 3.00%, and a PER (cola) assumption of 1.25% effective with the June 30, 2017 valuation. The lower inflation assumption also resulted in a lowering of the salary increase assumption and the COLA assumption. The assumptions are summarized in Section F of the report.

Experience During the Year

Assumption changes increased liabilities by \$2.4 million as of June 30, 2017. For additional information on the actuarial impact of the assumption changes, please see Section H.

Aside from assumption changes, the plan experienced a liability loss of \$0.4 million during fiscal year 2017.

The plan experienced an asset loss of \$9.2 million during fiscal year 2017. As of June 30, 2017, the amount of outstanding assets losses not recognized in the actuarial value of assets was \$49.1 million. If the Plan does not earn investment earnings in excess of the assumed 7.25% per year, these losses will need to be recognized in future valuations. This will put downward pressure on the funded ratio and upward pressure on the Actuarially Determined Contribution.

Benefit Provision Changes

There were no changes to benefit provisions since the prior valuation. The benefit provisions are summarized in Section D of the report.

Financial Position and Summary of Results

The funded ratio on an actuarial value of assets basis increased from June 30, 2016 to June 30, 2017. On a market value of assets basis, the funded ratio also increased from June 30, 2016 to June 30, 2017.

Exhibit A.1		
City of Phoenix Employees' Retirement System		
Executive Summary		
	June 30, 2017	June 30, 2016
1. Total Actuarially Determined Contribution		
a. Dollar Amount	\$ 203,958,677	\$ 190,893,000
b. As a % of Payroll	37.99%	37.16%
2. Funded Status		
a. Actuarial Accrued Liability	\$ 4,129,452,386	\$ 3,984,137,000
b. Actuarial Value of Assets (AVA)	2,402,707,329	2,283,215,676
c. Unfunded Liability (AVA-basis)	1,726,745,057	1,700,921,324
d. Funded Ratio (AVA-basis)	58.18%	57.31%
e. Market Value of Assets (MVA)	\$ 2,353,607,330	\$ 2,151,420,519
f. Unfunded Liability (MVA-basis)	1,775,845,056	1,832,716,481
g. Funded Ratio (MVA-basis)	57.00%	54.00%
3. Summary of Census Data		
a. Actives		
i.(a) Tier 1 Count	6,030	6,416
i.(b) Tier 2 Count	823	953
i.(c) Tier 3 Count	1,177	414
i.(d) Total Active Count	8,030	7,783
ii. Total Annual Compensation	\$ 521,709,266	\$ 496,332,801
iii. Average Projected Compensation	64,970	63,771
iv. Average Age	46.5	46.5
v. Average Service	12.3	12.2
b. Deferred Vested Member Counts	925	885
c. Retiree Counts	5,661	5,576
d. Beneficiary and Alternate Payee Counts	1,072	1,060
e. Disability Counts	247	249
f. Total Members Included in Valuation	15,935	15,553

The funded ratio may not be appropriate for assessing the need for future contributions. The funded ratio is not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations.

SECTION B

VALUATION RESULTS

Exhibit B.1
City of Phoenix Employees' Retirement System
Actuarial Valuation Results
Actuarial Accrued Liability

	June 30, 2017				June 30, 2016
	Tier 1	Tier 2	Tier 3	Total	Total
1. Active Members					
a. Retirement Benefits	\$ 1,410,355,608	\$ 16,911,882	\$ 4,229,744	\$ 1,431,497,234	\$ 1,343,113,000
b. Withdrawal Benefits	26,789,803	1,743,785	649,507	29,183,095	25,357,000
c. Disability Benefits	15,096,927	322,368	31,600	15,450,895	15,306,000
d. Death Benefits	14,908,759	303,096	25,418	15,237,273	12,802,000
e. Total	<u>\$ 1,467,151,097</u>	<u>\$ 19,281,131</u>	<u>\$ 4,936,269</u>	<u>\$ 1,491,368,497</u>	<u>\$ 1,396,578,000</u>
2. Members with Deferred Benefits				\$ 68,936,162	\$ 64,570,000
3. Members Receiving Benefits				\$ 2,569,147,727	\$ 2,522,989,000
4. Total				\$ 4,129,452,386	\$ 3,984,137,000
5. Actuarial Value of Assets				<u>\$ 2,402,707,329</u>	<u>\$ 2,283,216,000</u>
6. Unfunded Actuarial Accrued Liability				\$ 1,726,745,057	\$ 1,700,921,000

Exhibit B.2
City of Phoenix Employees' Retirement System
Actuarial Valuation Results
Normal Cost for Fiscal Year Ending June 30, 2019

	Tier 1	Tier 2	Tier 3	Total	Prior Year
1. Dollar Normal Cost					
a. Retirement Benefits	\$ 49,467,012	\$ 5,701,705	\$ 5,420,322	\$ 60,589,038	\$ 59,928,632
b. Withdrawal Benefits	7,075,526	1,031,413	1,236,766	9,343,706	9,161,828
c. Disability Benefits	1,490,641	158,932	167,278	1,816,852	1,778,217
d. Death Benefits	1,038,808	138,180	144,968	1,321,955	1,492,874
e. Total	<u>\$ 59,071,987</u>	<u>\$ 7,030,230</u>	<u>\$ 6,969,334</u>	<u>\$ 73,071,551</u>	<u>\$ 72,361,551</u>
2. Normal Cost as a Percentage of Pay	14.70%	16.79%	12.77%	14.67%	15.38%
3. Projected Payroll for FYE June 30, 2019	\$ 432,741,997	\$ 44,531,341	\$ 59,660,972	\$ 536,934,310	\$ 513,704,449
4. Dollar Normal Cost for FYE June 30, 2019	\$ 63,632,724	\$ 7,474,768	\$ 7,647,573	\$ 78,755,065	\$ 78,990,776

Exhibit B.3
City of Phoenix Employees' Retirement System
Actuarial Valuation Results
Present Value of Projected Benefits

	June 30, 2017				June 30, 2016
	Tier 1	Tier 2	Tier 3	Total	Total
1. Active Members					
a. Retirement Benefits	\$ 1,759,591,834	\$ 77,426,188	\$ 60,232,336	\$ 1,897,250,358	\$ 1,828,672,000
b. Withdrawal Benefits	78,458,153	14,494,755	15,177,219	108,130,127	105,892,000
c. Disability Benefits	25,935,795	2,250,247	1,948,061	30,134,103	30,320,000
d. Death Benefits	22,061,218	1,793,192	1,536,398	25,390,808	24,439,000
e. Total	<u>\$ 1,886,047,000</u>	<u>\$ 95,964,382</u>	<u>\$ 78,894,014</u>	<u>\$ 2,060,905,396</u>	<u>\$ 1,989,323,000</u>
2. Members with Deferred Benefits				\$ 68,936,162	\$ 64,570,000
3. Members Receiving Benefits					
a. Healthy Retirees				\$ 2,333,621,103	\$ 2,289,942,000
b. Disabled Retirees				47,210,143	46,213,000
c. Beneficiaries				188,316,481	186,835,000
d. Total				<u>\$ 2,569,147,727</u>	<u>\$ 2,522,989,000</u>
4. Total				\$ 4,698,989,285	\$ 4,576,882,000

Exhibit B.4
City of Phoenix Employees' Retirement System
Development of the Actuarially Determined Contribution

June 30, 2017

1. Present Value of Projected Benefits	
a. Retirees and Beneficiaries	\$ 2,569,147,727
b. Deferred vested members	68,936,162
c. Active members	<u>2,060,905,396</u>
d. Total [(a) + (b) + (c)]	\$ 4,698,989,285
2. Present Value of Future Normal Costs	\$ 569,536,899
3. Entry Age Normal Accrued Liability [(1) - (2)]	\$ 4,129,452,386
4. Actuarial Value of Assets	<u>2,402,707,329</u>
5. Unfunded Actuarial Accrued Liability [(3) - (4)]	\$ 1,726,745,057

Development of the Actuarially Determined Contribution

Fiscal Year Ending	June 30, 2019
6. Entry Age Normal Cost	\$ 78,755,065
7. Administrative Expenses	391,511
8. Amortization of UAAL	<u>124,812,101</u>
9. Actuarially Determined Contribution [(6) + (7) + (8)]	\$ 203,958,677
10. Projected Payroll	\$ 536,934,310
11. Actuarially Determined Contribution as a Percent of Compensation	37.986%

Development of Actuarially Determined Contribution (Continued)

The Actuarially Determined Contribution (ADC) is calculated in accordance with the Funding Policy adopted by the Board. The unfunded accrued liability is amortized according to the following schedule. Please see Section G of this report for a full description of the funding policy.

Exhibit B.5					
City of Phoenix Employees' Retirement System					
Amortization of Unfunded Actuarial Liability as of June 30, 2017					
Base Year	Remaining Base as of June 30, 2017	Years Remaining as of June 30, 2017	Remaining Base as of June 30, 2018	Years Remaining as of June 30, 2018	Amortization Payment For FYE June 30, 2019
2013 UAL	\$ 1,124,954,199	21	\$ 1,122,958,052	20	\$ 83,102,237
2013 Assumption Changes	479,685,701	21	478,834,535	20	35,435,180
2014 Experience Gain	(59,354,629)	21	(59,249,308)	20	(4,384,625)
2015 Experience Gain	(3,033,491)	21	(3,028,108)	20	(224,089)
2015 Assumption Changes	284,137,617	18	293,059,539	17	18,145,155
2016 Experience Gain	(33,610,485)	21	(33,550,846)	20	(2,482,862)
2016 Plan Changes	(3,471,309)	21	(3,465,150)	20	(256,431)
2016 Assumption Changes	(74,626,630)	21	(74,494,211)	20	(5,512,793)
2017 Experience Loss	9,644,262	20	10,343,471	19	791,688
2017 Assumption Changes	2,419,822	20	2,595,259	19	198,641
Total	\$ 1,726,745,057		\$ 1,734,003,234		\$ 124,812,101

The payment of the 2015 assumption changes is phased-in over four years. The first year payment was one-fourth of the regularly calculated amortization payment, increasing each year until the end of the phase-in period. The outstanding balance at the end of the phase-in period is then amortized such that the full amount is paid off by the end of the remaining period.

Exhibit B.6
City of Phoenix Employees' Retirement System
Plan Experience for Fiscal Year 2017

Liabilities		
1. Actuarial Accrued Liability at June 30, 2016		\$ 3,984,136,856
2. Normal Cost during Fiscal Year 2017		72,875,783
3. Benefit Payments during Fiscal Year 2017		223,667,304
4. Interest on Items 1-3 to End of Year		293,257,809
5. Change in Actuarial Accrued Liability Due to Assumption Changes		2,419,822
6. Change in Actuarial Accrued Liability Due to Provision Changes		-
7. Expected Actuarial Accrued Liability at June 30, 2017		4,129,022,966
8. Actual Actuarial Accrued Liability at June 30, 2017		4,129,452,386
9. Liability (Gain)/Loss		429,420
Assets		
10. Actuarial Value of Assets at June 30, 2016		\$ 2,283,215,676
11. Benefit Payments and Administrative Expenses during Fiscal Year 2017		224,047,412
12. Contributions during Fiscal Year 2017		183,023,324
13. Interest on Items 10-12 to End of Year		169,730,583
14. Expected Actuarial Value of Assets at June 30, 2017		2,411,922,171
15. Actual Actuarial Value of Assets at June 30, 2017		2,402,707,329
16. Asset (Gain)/Loss		9,214,842
Total		
17. Total (Gain)/Loss [9. + 16.]		\$ 9,644,262

Exhibit B.7
City of Phoenix Employees' Retirement System
Plan Experience for Fiscal Year 2017
(Gain)/Loss by Source

1. Asset (Gain)/Loss	\$ 9,214,842
2. Liability (Gain)/Loss	
a. Salary (Gain)/Loss	(13,859,880)
b. New Members and Rehire (Gain)/Loss	4,474,950
c. Withdrawal (Gain)/Loss	1,885,933
d. Retirement (Gain)/Loss	(7,512,781)
e. Annuitant Mortality (Gain)/Loss	2,808,346
f. Difference Between Expected and Actual COLA	(23,023,278)
g. Transition and replication differences	40,553,204
h. Other Demographic (Gain)/Loss	(4,897,074)
i. Total	<u>429,420</u>
3. Total (Gain)/Loss	\$ 9,644,262

Exhibit B.8
City of Phoenix Employees' Retirement System
Schedule of Funding Progress

Actuarial Valuation Date	Actuarial Value of Assets	Actuarial Accrued Liability (AAL)	Unfunded AAL (UAAL)	Funded Ratio	Covered Payroll	UAAL as a Percentage of Covered Payroll
(1)	(2)	(3)	(4)=(3)-(2)	(5)=(2)/(3)	(6)	(7)=(4)/(6)
6/30/2007	\$ 1,816,508	\$ 2,166,119	\$ 349,611	83.9%	\$ 535,079	65.3%
6/30/2008	1,908,414	2,413,365	504,951	79.1%	566,512	89.1%
6/30/2009	1,895,148	2,518,094	622,946	75.3%	539,468	115.5%
6/30/2010	1,868,093	2,697,288	829,195	69.3%	550,175	150.7%
6/30/2011	1,834,620	2,752,909	918,289	66.7%	513,322	178.9%
6/30/2012	1,827,528	2,939,374	1,111,845	62.2%	506,017	219.7%
6/30/2013	1,961,939	3,055,606	1,093,668	64.2%	508,032	215.3%
6/30/2014	2,120,700	3,614,784	1,494,084	58.7%	509,267	293.4%
6/30/2015	2,202,923	3,975,908	1,772,985	55.4%	484,853	365.7%
6/30/2016	2,283,216	3,984,137	1,700,921	57.3%	496,333	342.7%
6/30/2017	2,402,707	4,129,452	1,726,745	58.2%	521,709	331.0%

Amounts in thousands

Exhibit B.9
City of Phoenix Employees' Retirement System
Solvency Test

Valuation Date	Aggregated Accrued Liabilities for				Actuarial Value of Assets	Portion of Accrued Liabilities Covered by Reported Assets		
	Active Members Contributions	Retirees Beneficiaries and Vested Terminations	Members (Employer Financed Portion)			(5)/(2)	[(5)-(2)]/(3)	[(5)-(2)-(3)]/(4)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
June 30, 2007	\$ 403,819	\$ 964,006	\$ 798,294	\$ 1,816,509	100.0%	100.0%	56.2%	
June 30, 2008	433,742	1,066,886	912,737	1,908,414	100.0%	100.0%	44.7%	
June 30, 2009	446,039	1,193,391	878,664	1,895,148	100.0%	100.0%	29.1%	
June 30, 2010	445,141	1,311,929	940,217	1,868,093	100.0%	100.0%	11.8%	
June 30, 2011	446,456	1,431,877	874,576	1,834,620	100.0%	96.9%	0.0%	
June 30, 2012	443,964	1,525,152	970,258	1,827,528	100.0%	90.7%	0.0%	
June 30, 2013	396,583	1,881,123	1,201,741	1,962,533	100.0%	83.2%	0.0%	
June 30, 2014	393,754	2,099,274	1,121,756	2,120,700	100.0%	82.3%	0.0%	
June 30, 2015	383,029	2,465,862	1,127,017	2,202,923	100.0%	73.8%	0.0%	
June 30, 2016	393,626	2,522,989	1,067,522	2,283,216	100.0%	74.9%	0.0%	
June 30, 2017	406,651	2,638,084	1,084,717	2,402,707	100.0%	75.7%	0.0%	

Amounts in thousands

Exhibit B.10
City of Phoenix Employees' Retirement System
Analysis of Financial Experience
Dollar Amounts in Thousands

Fiscal Year	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008
1. UAAL at Start of Year	\$ 1,700,921	1,772,985	1,494,084	1,516,915	1,111,845	918,289	829,195	622,946	504,950	349,611
2. Normal Cost for Year*	73,256	80,757	75,310	78,331	71,828	77,366	80,099	78,731	83,089	72,806
3. Contributions	(183,023)	(178,288)	(157,314)	(153,885)	(143,502)	(133,822)	(119,613)	(116,482)	(98,157)	(95,435)
4. Assumed Investment Income Accrual on (1), (2) and (3)	<u>123,527</u>	<u>129,383</u>	<u>109,037</u>	<u>110,987</u>	<u>86,136</u>	<u>71,248</u>	<u>64,652</u>	<u>48,228</u>	<u>39,755</u>	<u>27,005</u>
5. Expected UAAL Before Changes	\$ 1,714,681	1,804,836	1,521,117	1,552,347	1,126,307	933,081	854,333	633,424	529,637	353,987
6. Effect of Assumption/Method Changes	2,420	(69,420)	254,870	-	423,247	-	-	-	-	74,539
7. Effect of Benefit Changes	<u>-</u>	<u>(3,229)</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
8. Expected UAAL After Changes	\$ 1,717,101	1,732,187	1,775,987	1,552,347	1,549,554	933,081	854,333	633,424	529,637	428,526
9. Actual UAAL	<u>1,726,745</u>	<u>1,700,921</u>	<u>1,772,985</u>	<u>1,494,084</u>	<u>1,516,915</u>	<u>1,111,845</u>	<u>918,289</u>	<u>829,195</u>	<u>622,946</u>	<u>504,950</u>
10. Gain / (Loss) [8. - 9.]	\$ (9,644)	31,266	3,002	58,263	32,639	(178,764)	(63,956)	(195,771)	(93,309)	(76,424)
11. As % of AAL at Start of Year	0.00%	0.80%	0.10%	1.70%	1.10%	-6.50%	-2.40%	-7.80%	-3.90%	-3.50%

* Includes administrative expenses for 2017

SECTION C

PLAN ASSETS

Exhibit C.1
City of Phoenix Employees' Retirement System
Statement of Plan Net Assets

	June 30, 2017
Assets	
Cash and Cash Equivalents	\$ 38,582,093
Investments, at fair value:	
Fixed income	512,000,731
Equity securities	592,444,227
Hedge funds	254,935,986
Real estate investments	315,307,165
International equities	690,981,703
Total investments	\$ 2,365,669,812
Receivables:	
Employer contributions	4,987,977
Employee contributions	1,006,165
Dividends and Interest	1,541,274
Unsettled transactions	123,078,175
Other	335,094
Total receivables	\$ 130,948,685
Total assets	\$ 2,535,200,590
Accounts Payable	
Accrued investment expenses	1,410,889
Unsettled transactions	179,794,456
Other	387,915
Total payables	\$ 181,593,260
Net assets held in trust for pension benefits	\$ 2,353,607,330

Exhibit C.2
City of Phoenix Employees' Retirement System
Statement of Changes in Plan Net Assets

	<u>Year Ended June 30, 2017</u>	<u>Year Ended June 30, 2016</u>
Additions to Net Assets Attributed to:		
Contributions		
Employer contributions	\$ 152,153,254	\$ 119,844,242
Plan members contributions	30,870,070	29,305,943
Inter-system transfers	42,597	216,669
Total	<u>\$ 183,065,921</u>	<u>\$ 149,366,854</u>
Net Investment Income		
Net appreciation in fair value of investments	221,631,739	(14,313,571)
Interest and dividends	26,899,919	27,549,309
Other	4,386,387	3,079,156
	<u>252,918,045</u>	<u>16,314,894</u>
Less Investment expense	(9,707,146)	(7,143,442)
Net investment income	<u>\$ 243,210,899</u>	<u>\$ 9,171,452</u>
Total additions	<u>\$ 426,276,820</u>	<u>\$ 158,538,306</u>
Deductions to Net Assets Attributed to:		
Benefit payments	220,276,330	213,046,977
Refunds	3,226,736	3,047,225
Inter-system transfers	206,835	315,120
Administrative expenses	380,108	234,097
Total deductions	<u>\$ 224,090,009</u>	<u>\$ 216,643,419</u>
Change in net assets	202,186,811	(58,105,113)
Net assets held in trust for benefits:		
Beginning of year	2,151,420,519	2,209,525,632
End of year	<u>\$ 2,353,607,330</u>	<u>\$ 2,151,420,519</u>

Exhibit C.3
City of Phoenix Employees' Retirement System
Development of the Actuarial Value of Assets

Item	Year Ending June 30, 2017
1. Actuarial Value of Assets, Beginning of Year	\$ 2,283,215,676
2. Net Cash Flow	\$ (41,024,088)
3. Expected return	\$ 169,730,584
4. Actual Return	\$ 243,210,899
5. Excess return [(4) - (3)]	\$ 73,480,315
6. Gains/(Losses)	
a. Current Year	73,480,315
b. Prior Year	(153,570,531)
c. 2nd Prior Year	(109,699,880)
d. 3rd Prior Year	152,930,726
e. Total	(36,859,370)
7. Phase-In Amount [25% of 6.e.]	\$ (9,214,843)
8. Actuarial Value of Assets, End of Year [(1) + (2) + (3) + (7)]	\$ 2,402,707,329
9. Estimated Rate of Return	7.09%
10. Ratio of Actuarial to Market Value of Assets	102.1%

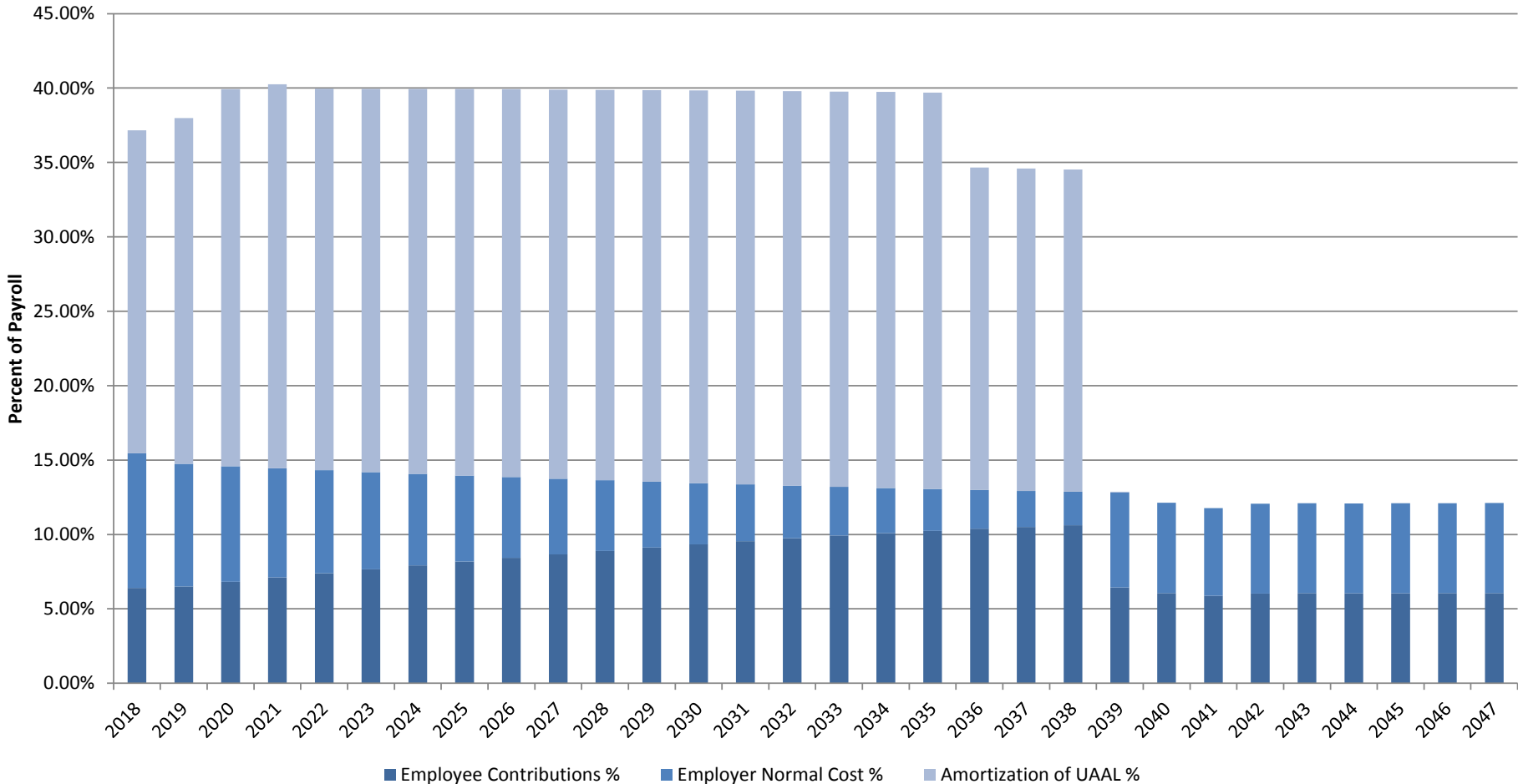
SECTION D

PROJECTIONS

**City of Phoenix Employees Retirement System
Projection Results Based on June 30, 2017 Actuarial Valuation**

Valuation as of June 30,	Market Return for FY Beginning on Valuation Date	Payroll (in Millions)	Employee Contributions (% of Payroll)	Employer Contributions in FY Following Val Date (% of Payroll)	Employer Contributions in FY Following Val Date (in Millions)	Actuarial Accrued Liability (AAL, in Millions)	Actuarial Value of Assets (AVA, in Millions)	Unfunded Actuarial Accrued Liability (UAAL, in Millions)	Funded Ratio	Projected Benefit Payments in FY Following Val Date (in Millions)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
2017	7.25%	\$521	6.40%	30.76%	\$160	\$4,129	\$2,403	\$1,727	58.2%	\$229
2018	7.25%	537	6.51%	31.47%	169	4,268	2,491	1,777	58.4%	243
2019	7.25%	548	6.82%	33.11%	181	4,404	2,610	1,794	59.3%	256
2020	7.25%	560	7.11%	33.14%	186	4,537	2,778	1,760	61.2%	269
2021	7.25%	573	7.39%	32.57%	187	4,668	2,933	1,735	62.8%	281
2022	7.25%	586	7.66%	32.28%	189	4,797	3,092	1,705	64.5%	293
2023	7.25%	601	7.92%	32.02%	192	4,923	3,254	1,669	66.1%	306
2024	7.25%	615	8.18%	31.76%	195	5,048	3,422	1,626	67.8%	318
2025	7.25%	630	8.42%	31.50%	199	5,170	3,594	1,575	69.5%	331
2026	7.25%	646	8.66%	31.23%	202	5,289	3,772	1,517	71.3%	344
2027	7.25%	663	8.89%	30.97%	205	5,405	3,956	1,448	73.2%	357
2028	7.25%	680	9.12%	30.74%	209	5,517	4,147	1,370	75.2%	370
2029	7.25%	697	9.34%	30.50%	213	5,626	4,345	1,282	77.2%	383
2030	7.25%	715	9.54%	30.28%	217	5,731	4,550	1,181	79.4%	396
2031	7.25%	734	9.74%	30.05%	221	5,832	4,764	1,068	81.7%	409
2032	7.25%	754	9.92%	29.85%	225	5,929	4,989	941	84.1%	421
2033	7.25%	774	10.09%	29.65%	229	6,023	5,224	799	86.7%	432
2034	7.25%	795	10.24%	29.46%	234	6,114	5,473	640	89.5%	443
2035	7.25%	818	10.38%	24.28%	199	6,202	5,737	465	92.5%	453
2036	7.25%	842	10.50%	24.10%	203	6,289	5,977	312	95.0%	462
2037	7.25%	866	10.61%	23.92%	207	6,376	6,232	144	97.7%	471
2038	7.25%	892	6.44%	6.44%	57	6,463	6,506	(43)	100.7%	478
2039	7.25%	919	6.06%	6.06%	56	6,552	6,601	(49)	100.7%	484
2040	7.25%	948	5.89%	5.89%	56	6,644	6,693	(48)	100.7%	489
2041	7.25%	978	6.03%	6.03%	59	6,742	6,786	(44)	100.7%	494
2042	7.25%	1,009	6.05%	6.05%	61	6,845	6,888	(43)	100.6%	497
2043	7.25%	1,041	6.04%	6.04%	63	6,956	6,998	(42)	100.6%	501
2044	7.25%	1,075	6.05%	6.05%	65	7,075	7,116	(41)	100.6%	505
2045	7.25%	1,109	6.05%	6.05%	67	7,203	7,243	(40)	100.6%	510
2046	7.25%	1,144	6.05%	6.05%	69	7,339	7,378	(39)	100.5%	516
2047	7.25%	1,180	6.06%	6.06%	71	7,482	7,521	(39)	100.5%	524

Projected Contribution Rate



SECTION E

SUMMARY OF BENEFIT PROVISIONS

SUMMARY OF BENEFIT PROVISIONS

Membership

Full-time employees of the City of Phoenix other than police officers, firefighters, or elected officials who are covered by another retirement system to which the City contributes.

Members who were hired before July 1, 2013, as well as members who join the City after July 1, 2013 who were members of ASRS prior to July 1, 2011 and did not withdraw their contributions are Tier 1 members.

Members hired into employment with the City between July 1, 2013 and December 31, 2015 who are not Tier 1 members are Tier 2 members.

Members hired into employment with the City on or after July 1, 2016 who are not Tier 1 members or Tier 2 members are Tier 3 members.

Final Average Compensation (FAC)

Tier 1/Tier 2

The average of annual compensation for the period of 3 consecutive years producing the highest average contained within the last 10 years immediately preceding retirement.

Tier 3

The average of annual compensation for the period of 5 consecutive years producing the highest average contained within the last 10 years immediately preceding retirement. Annual compensation will be limited to the first \$125,000 of compensation, indexed to inflation (CPI-U) each January 1, commencing on January 1, 2017.

Credited Service

Credited service is determined based on Section 14 of Chapter XXIV of the Phoenix City Charter as well as COPERS administrative policy number 43. In no case is more than a year of service credited to any member for all service rendered in any calendar year. The amount of service credited to members varies by Tier, as detailed below.

Tier 1

A member is credited with a month of service for each calendar month in which the member performs at least 10 days of City service. A member is credited with a year of service for any calendar year in which the member has at least 10 months of credited service. If a member has less than 10 months of credited service for any calendar year, they are credited for the actual number of months.

Tier 2/Tier 3

A member is credited with a month of service for each calendar month in which the member performs at least 20 days of City service. A member is credited with a year of service for any calendar year in which the member has at least 12 months of credited service. If a member has less than 12 months of credited service for any calendar year, they are credited for the actual number of months.

Voluntary Retirement (no reduction for age)

Tier 1

Eligibility:

Sum of age and credited service equals 80 or more, age 60 with 10 or more years of credited service or age 62 with 5 or more years of credited service.

Annual Benefit:

Unused sick leave service multiplied by 2% of FAC plus 2% of FAC times credited service up to 32.5 years plus 1% of FAC times service in excess of 32.5 years plus 0.5% of FAC times service in excess of 35.5 years. Minimum monthly pension is \$250 (\$500 if member has 15 or more years of service).

Tier 2/Tier3

Eligibility:

Sum of age and credited service equals 87 or more, age 60 with 10 or more years of credited service or age 62 with 5 or more years of credited service.

Annual Benefit:

Unused sick leave service multiplied by 2% of FAC for Tier 2 members only plus FAC times credited service times the corresponding accrual rate:

Tier 2		Tier 3	
Years of Service	Accrual Rate	Years of Service	Accrual Rate
0<Service≤20	2.10%	0<Service≤10	1.85%
20<Service≤25	2.15%	10<Service≤20	1.90%
25<Service≤30	2.20%	20<Service≤30	2.00%
Service>30	2.30%	Service>30	2.10%

Note that for Tier 2 and Tier 3, the same accrual rate will apply for each year of service based on the total years of service.

Deferred Vested Retirement

Eligibility:

Termination of City employment prior to age 62 with 5 or more years of credited service.

Annual Benefit:

Accrued regular retirement amount based on credited service, unused sick leave service, and FAC at time of termination, payable beginning at age 62.

Duty Disability Retirement

Eligibility:

Total and permanent disability incurred in line of duty with the City.

Annual Benefit:

Computed in the same manner as the regular retirement amount base on FAC and credited service at time of disability retirement. Minimum is 15% of FAC for Tier 1 members and 15.75% for Tier 2 and Tier 3 members. Maximum during worker's compensation period is difference between final compensation and annualized workers compensation. At expiration of worker's compensation period, amount is recomputed to include years during which worker's compensation was paid.

Non-Duty Disability Retirement

Eligibility:

Total and permanent disability after 10 or more years of credited service.

Annual Benefit:

Computed in the same manner as the regular retirement amount base on FAC and credited service at time of disability retirement.

Pre-Retirement Duty Death Benefit

Eligibility:

Death in line of duty with the City and compensable under worker's compensation.

Annual Benefit:

To the spouse: Joint and 100% survivor actuarial equivalent of accrued regular retirement amount based on FAC and credited service and unused sick leave service at time of death. Minimum of 10 years of service is credited. To the children of a deceased member with 10 or more years of credited service: each child shall receive a monthly pension of \$200 until adoption, marriage, death or attainment of age 18.

Pre-Retirement Non-Duty Death Benefit

Eligibility:

10 or more years of credited service.

Annual Benefit:

Same as Pre-Retirement Duty Death Benefit.

Refund of Contributions

Eligibility:

Termination of covered service employment prior to eligibility for any other benefits.

Annual Benefit:

Accumulated member contribution with interest at no more than 3.75% annually after July 1, 2016.

Pension Equalization Reserve (PER)

The PER is credited with Excess Earnings, if any, each calendar year. Excess Earnings are defined as the excess over 8.0% of the annual average of the time-weighted rates of return for the immediately preceding five calendar years. The amounts credited to the PER are either used to fund percentage increases to pension amounts or one-time post retirement distribution benefits (13th checks).

On July 1 of each year, persons in receipt of a pension for at least 36 months receive a percentage increase based on the lesser of:

- i. Phoenix area Consumer Price Index (CPI) and
- ii. The amount the balance in the PER can fully fund

The increase, subject to the availability of funds in the PER, is payable beginning with the April 1 payment each year, retroactive to January 1 of the same year.

Also, after each plan year's return is known, all pensioners (excluding minors) as of the end of the plan year are eligible to receive a one-time post retirement distribution (13th check). The 13th check is a percentage of the pensioner's annual benefits based on the lesser of:

- i. One half of the Phoenix area Consumer Price Index (CPI) and
- ii. The excess of the rate of return over the assumed interest rate

The percentage cannot be more than three percent, but must be at least one percent and is subject to the availability of funds in the PER. The 13th check is payable on December 1.

The PER is only applicable for Tiers 1 and 2.

Projected Percentage

Actuarially determined normal cost rate plus an amortization rate on the unfunded actuarial liability and a rate for administrative expenses, stated as a percentage of projected member compensation.

Member Contribution Rates

Tier 1: 5% of pay
Tier 2/Tier 3: 50% of the Projected Percentage not to exceed 11% of pay on or after January 1, 2016

City Contribution Rates

Total Projected Percentage less Member Contribution Rates for each Tier.

Note: The summary of plan provisions is designed to outline principal plan benefits. If COPERS should find the plan summary not in accordance with the actual plan provisions, the actuary should immediately be alerted so the proper provisions are valued.

SECTION F

SUMMARY OF PARTICIPANT DATA

Exhibit F.1
City of Phoenix Employees' Retirement System
Summary of Census Data

	June 30, 2017	June 30, 2016
1. Active Members		
a. Counts	8,030	7,783
b. Annual Compensation	\$ 521,709,266	\$ 496,332,801
c. Average Annual Compensation	\$ 64,970	\$ 63,771
d. Average Age	46.5	46.5
e. Average Service	12.3	12.2
2. Deferred Vested Members		
a. Counts	925	885
b. Annual Deferred Benefits	\$ 11,638,455	\$ 11,080,138
c. Average Benefit	\$ 12,582	\$ 12,520
3. Retired Members		
a. Counts	5,661	5,576
b. Annual Benefits	\$ 195,912,247	\$ 191,137,835
c. Average Benefit	\$ 34,607	\$ 34,279
4. Disability		
a. Counts	247	249
b. Annual Deferred Benefits	\$ 4,000,756	\$ 3,895,823
c. Average Benefit	\$ 16,197	\$ 15,646
5. Beneficiaries and QDROs		
a. Counts	1,072	1,060
b. Annual Benefits	\$ 20,639,481	\$ 20,103,429
c. Average Benefit	\$ 19,253	\$ 18,965
6. Total Members Included in Valuation	15,935	15,553

Exhibit F.2
Summary of Changes in Participant Status
During Fiscal Year 2017

	Active Participants	With Deferred Benefits	Retirees	Disability	QDROs	Beneficiaries	Total
A. Number as of June 30, 2016	7,783	885	5,576	249	151	909	15,553
1. Age Retirements	(211)	(32)	243				-
2. Disability	(1)	(10)		11			-
3. Deceased	(6)	(4)	(158)	(13)	(2)	(62)	(245)
4. New Beneficiary					9	67	76
5. Terminated - Vested	(121)	121					-
6. Terminated - Nonvested	(268)						(268)
7. Cashouts (Terminations)	(3)	(19)					(22)
8. Cashouts (Retirements)							-
9. Rehired as Active	24	(16)					8
10. New Members	833						833
11. Expired Benefits							-
12. Data Adjustments							-
B. Number as of June 30, 2017	8,030	925	5,661	247	158	914	15,935

Exhibit F.3
Active Member Counts by Age and Service
as of June 30, 2017

Age	Service							Total
	0-4	5-9	10-14	15-19	20-24	25-29	Over 30	
Under 20	2							2
20-24	146							146
25-29	349	37	7					393
30-34	407	111	164	2				684
35-39	339	128	323	120	5			915
40-44	306	100	327	290	81	2		1,106
45-49	256	124	330	335	235	75	3	1,358
50-54	228	102	249	304	291	199	54	1,427
55-59	180	83	259	250	219	105	59	1,155
60-64	82	43	142	150	102	63	64	646
Over 65	18	22	65	35	30	18	10	198
Total	2,313	750	1,866	1,486	963	462	190	8,030

Exhibit F.4
Active Member Average Salary by Age and Service
as of June 30, 2017

Age	Service							Total
	0-4	5-9	10-14	15-19	20-24	25-29	Over 30	
Under 20	*							*
20-24	\$39,090							\$39,090
25-29	48,110	54,028	50,112					46,307
30-34	49,049	61,358	58,327	*				53,266
35-39	53,733	64,805	66,144	68,639	67,270			61,289
40-44	53,290	61,363	69,028	72,698	74,932	*		65,406
45-49	54,595	63,422	67,867	73,336	80,536	78,880	*	69,436
50-54	57,982	62,225	65,283	69,036	77,980	86,749	73,115	70,387
55-59	61,290	62,972	63,578	70,393	74,130	74,411	84,541	68,380
60-64	66,419	77,754	63,643	67,937	77,599	75,150	75,764	70,176
Over 65	62,330	66,066	68,771	68,011	71,308	79,157	77,061	69,884
Total	\$53,840	63,301	65,637	70,752	77,168	80,686	77,840	\$64,970

*Average salary not shown for fields with less than four active members.

Exhibit F.5 Summary of Inactive Vested Members		
Age	Number of Members	Monthly Benefit
<30	4	\$1,482
30-34	11	4,383
35-39	12	8,264
40-44	14	11,459
45-49	13	13,061
50-54	29	44,459
55-59	21	19,169
60-64	12	11,789
65& Up	2	1,189

Exhibit F.6 Summary of Members in Pay Status						
Age	Service Retirees		Disabled Retirees		Beneficiaries/QDROs	
	Number of Members	Annual Benefit	Number of Members	Annual Benefit	Number of Members	Annual Benefit
<55	195	\$9,561,084	38	\$726,235	91	\$1,346,166
55-59	638	\$30,532,458	49	\$819,596	65	\$1,303,253
60-64	1141	\$45,009,395	60	\$988,571	108	\$2,170,383
65-69	1472	\$48,890,375	45	\$695,861	173	\$3,473,415
70-74	979	\$30,473,595	20	\$275,545	140	\$3,056,730
75-79	601	\$16,343,570	16	\$209,850	170	\$3,443,443
80-84	327	\$8,223,432	13	\$197,441	124	\$2,477,521
85-89	202	\$4,770,786	4	\$43,258	121	\$2,100,802
90 & Up	106	\$2,107,554	2	\$44,399	80	\$1,267,765

Exhibit F.7
Schedule of Retired Members Added to and Removed from Rolls
as of June 30, 2017

Year Ended	Added to Rolls		Removed		Total		Average Annual Pensions	% Increase in Pensions
	Count	Annual Pensions	Count	Annual Pensions	Count	Annual Pensions		
6/30/2008	348	13,809	148	2,732	4,417	113,433	25,681	10.8%
6/30/2009	426	15,789	174	3,002	4,669	126,220	27,034	11.3
6/30/2010	432	15,259	170	3,206	4,931	138,273	28,042	9.5
6/30/2011	444	15,251	184	3,574	5,191	149,950	28,887	8.4
6/30/2012	448	14,488	161	4,174	5,478	160,264	29,256	6.9
6/30/2013	426	12,574	201	3,996	5,703	168,843	29,606	5.4
6/30/2014	597	21,948	145	3,232	6,155	187,559	30,473	11.1
6/30/2015	578	22,483	192	4,225	6,541	205,816	31,466	9.7
6/30/2016	375	11,573	182	4,329	6,734	213,061	31,640	3.5
6/30/2017	321	9,317	233	4,395	6,822	218,364	32,009	2.5

Note: The dollar amounts of the pensions added to and removed from the rolls for years prior to June 30, 2017 were determined by prior actuaries. The amounts added to the rolls includes additions and deletions due to PER increases, in addition to the annual pensions for new retirees.

Exhibit F.8
Schedule of Retired Members by Type
as of June 30, 2017

Monthly Benefit	# of Retirees	Type of Retirement						
		Deferred	Normal or Voluntary	Duty Disability	Non-Duty Disability	Survivor Payment	Death Benefit	Alternate Payee
Deferred	925	925						
\$1 - \$300	95		45	1	0	14	22	13
\$301 - \$400	136		87	6	2	29	3	9
\$401 - \$500	135		86	7	2	31	1	8
\$501 - \$600	142		96	4	6	24	4	8
\$601 - \$700	170		91	3	9	52	5	10
\$701 - \$800	177		97	2	10	44	10	14
\$801 - \$900	189		119	5	21	29	8	7
\$901 - \$1,000	174		92	2	13	48	5	14
\$1,001 - \$1,100	196		119	4	11	44	9	9
\$1,101 - \$1,200	200		128	1	17	35	7	12
\$1,201 - \$1,300	166		117	1	12	24	4	8
\$1,301 - \$1,400	171		111	0	11	31	9	9
\$1,401 - \$1,500	178		132	2	8	25	9	2
\$1,501 - \$2,000	808		621	15	38	85	31	18
\$2,001 - \$2,500	859		737	2	12	87	12	9
\$2,501 - \$3,000	761		690	0	10	47	10	4
\$3,001 - \$4,000	1,124		1,051	0	8	52	12	1
\$4,001 - \$5,000	632		607	0	2	17	5	1
\$5,001 +	667		635	0	0	27	3	2
Total	7,905	925	5,661	55	192	745	169	158

SECTION G

ACTUARIAL ASSUMPTIONS AND METHODS

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

I. Valuation Date

The valuation date is June 30th of each plan year. This is the date as of which the actuarial present value of future benefits and the actuarial value of assets are determined.

II. Actuarial Cost Method

The actuarial valuation uses the Entry Age Normal actuarial cost method. Under this method, the employer contribution rate is the sum of (i) the employer normal cost rate, and (ii) a rate that will amortize the unfunded actuarial liability.

1. The valuation is prepared on the projected benefit basis. The present value of each participant's expected benefit payable at retirement or termination is determined, based on age, service, sex, compensation, and the interest rate assumed to be earned in the future (7.25%). The calculations take into account the probability of a participant's death or termination of employment prior to becoming eligible for a benefit, as well as the possibility of his terminating with a service benefit. Future salary increases are also anticipated. The present value of the expected benefits payable on account of the active participants is added to the present value of the expected future payments to retired participants and beneficiaries to obtain the present value of all expected benefits payable from the Plan on account of the present group of participants and beneficiaries.
2. The employer contributions required to support the benefits of the Plan are determined following a level percent of pay funding approach, and consist of a normal cost contribution and an unfunded accrued liability contribution, plus a component to cover administrative expenses.
3. The normal cost and the allocation of benefit values between service rendered before and after the valuation date were determined using the individual entry age actuarial cost method having the following characteristics of (i) the annual normal costs for each active member, payable from the date of entry into the system to the date of retirement, are sufficient to accumulate the value of the member's benefit at the time of retirement, and (ii) each annual normal cost is constant percentage of the member's year-by-year projected covered pay.
4. The unfunded accrued liability contributions are determined by subtracting the actuarial value of assets from the actuarial accrued liability. Amortization bases are established each year and amortized over periods in accordance with the following amortization methods.
 - a. The UAL as of June 30, 2013, developed prior to implementing the September 2013 assumption changes, is amortized over a closed 25-year period as a level percentage of payroll.

- b. The impact of the September 2013 assumption changes on the UAL is amortized over a closed 25-year period as a level percentage of payroll with a four-year phase-in to the full amortization rate. The phase-in is calculated by multiplying the first year amortization payment by 25 percent. For the second year, the amortization schedule is recalculated reflecting the 25 percent payment in the first year and the remaining 24-year period and the calculated amortization payment is then multiplied by 50 percent. The process is repeated until the full amortization payment is made beginning in the fourth year of the 25-year period.
- c. The impact of the August 2015 assumption changes on the UAL is amortized over a closed 20-year period as a level percentage of payroll with a four-year phase-in to the full amortization rate. The phase-in is calculated by multiplying the first year amortization payment by 25 percent. For the second year, the amortization schedule is recalculated reflecting the 25 percent payment in the first year and the remaining 19-year period and the calculated amortization payment is then multiplied by 50 percent. The process is repeated until the full amortization payment is made beginning in the fourth year of the 20-year period.
- d. Future gains and losses are amortized over closed 20-year periods as a level percentage of payroll from the valuation date in which they are first recognized. However, gains will not be amortized over a shorter period than the remaining period on the amortization of the 2013 UAL.

III. Actuarial Value of Assets

The actuarial value of assets is determined by recognizing market value gains and losses over a four-year period. Gain and loss bases to be spread over the four-year period are determined by comparing expected returns based on the market value of assets and cash flows during the year to actual investment returns. The actuarial value of assets must be between 80 and 120% of market value.

IV. Actuarial Assumptions

A. Economic Assumptions

1. Investment return: 7.25% per annum, compounded annually. Inflation is assumed to be 2.50%.
2. Salary increase rate: Individual salary increases are composed of a price inflation component, a real wage growth component, and a merit or longevity component that varies by age. The table below combines the various components of salary increases for sample ages. Growth in the total payroll is assumed to be 3.00%.

Sample Attained Age	Percentage Increase in Salary			
	Price Inflation	Real Wage Growth	Merit or Longevity	Total
20	2.50 %	0.50 %	6.60 %	9.60 %
25	2.50	0.50	5.00	8.00
30	2.50	0.50	3.65	6.65
35	2.50	0.50	2.60	5.60
40	2.50	0.50	1.85	4.85
45	2.50	0.50	1.25	4.25
50	2.50	0.50	0.75	3.75
55	2.50	0.50	0.40	3.40
60	2.50	0.50	0.15	3.15
65	2.50	0.50	0.00	3.00

3. COLA Due to Pension Equalization Reserve (PER): In September 2013, the Board first adopted an assumption valuing future benefits payable through the PER as a 1.5% annual compound cost-of-living adjustment (COLA). The PER only applies to Tier 1 and Tier 2 benefits. In August 2017, the assumption was lowered to 1.25% effective with the June 30, 2017 valuation.

B. Demographic Assumptions

1. Rates of Mortality for Healthy and Disabled Lives: Mortality rates are based on the sex-distinct employee and annuitant mortality tables described below, including adjustment factors applied to the published tables for each group. Half of active member deaths are assumed to be duty related. Future mortality improvements are reflected by applying the MP-2015 projection scale on a generational basis to the adjusted base tables from the base year shown below.

(i) Non-Annuitant – CalPERS employee mortality table without scale BB projection

Gender	Adjustment Factor	Base Year
<i>Male</i>	1.054	2009
<i>Female</i>	1.112	2009

(ii) Healthy Annuitant – CalPERS healthy annuitant mortality table without scale BB projection

Gender	Adjustment Factor	Base Year
<i>Male</i>	1.019	2009
<i>Female</i>	1.061	2009

(iii) Disabled Annuitant –RP-2014 Disabled Annuitant Mortality Tables without MP-2014 projection

Gender	Adjustment Factor	Base Year
<i>Male</i>	0.984	2006
<i>Female</i>	1.038	2006

Sample rates, including projections to 2017, are shown below.

Sample Attained Ages	Probability of Death Pre-Retirement		Sample Attained Ages	Probability of Death Post-Retirement		Sample Attained Ages	Probability of Death Post-Disability	
	Men	Women		Men	Women		Men	Women
20	0.024 %	0.016 %	20	0.020 %	0.014 %	20	0.582 %	0.191 %
25	0.033	0.020	25	0.024	0.018	25	0.669	0.195
30	0.043	0.025	30	0.034	0.029	30	0.625	0.269
35	0.052	0.037	35	0.055	0.049	35	0.794	0.411
40	0.067	0.050	40	0.098	0.091	40	1.033	0.594
45	0.091	0.065	45	0.194	0.183	45	1.568	0.853
50	0.132	0.093	50	0.427	0.433	50	1.770	1.035
55	0.214	0.146	55	0.562	0.440	55	2.099	1.411
60	0.334	0.213	60	0.770	0.510	60	2.591	1.827
65	0.475	0.296	65	0.985	0.677	65	3.302	2.205
70	0.636	0.409	70	1.584	1.106	70	4.203	2.849
75	0.857	0.594	75	2.650	1.945	75	5.694	4.164
80	1.197	0.936	80	4.713	3.336	80	8.072	6.307
85	8.478	6.075	85	8.478	6.075	85	11.846	9.532
90	14.577	11.181	90	14.577	11.181	90	17.714	13.860

3. Disability rates. The disability incidence rates are 0.960 times the CalPERS Public Agency Miscellaneous Ordinary Disability Incidence table for Males. Half of disabilities are assumed to be duty related. Sample disability rates of active members are provided in the table below. There rates apply to both male and female COPERS member.

Sample Attained Ages	Probability of Disablement
25	0.0163 %
30	0.0183
35	0.0471
40	0.1172
45	0.1834
50	0.2046
55	0.2122
60	0.2132

4. Termination rates (for causes other than death, disability or retirement): Termination rates are based on age and service. Termination rates are not applied after a member becomes eligible for a retirement benefit. Rates at selected ages are shown:

Probability of Termination						
Age	Years of Service					
	0	1	2	3	4	5+
20	17.00 %	15.00 %	9.00 %	8.00 %	6.25 %	5.50 %
25	17.00	15.00	9.00	8.00	6.25	5.50
30	15.00	11.25	8.00	6.75	5.25	4.50
35	15.00	8.75	7.00	5.50	4.50	3.50
40	15.00	7.50	6.25	4.50	4.00	2.75
45	15.00	6.50	5.50	4.50	4.00	2.25
50	15.00	6.50	5.50	4.50	4.00	2.00
55	15.00	6.50	5.50	4.50	4.00	2.00
60	15.00	6.50	5.50	4.50	4.00	2.00

5. Retirement rates.

Probability of Retirement				
Age	Years of Service			
	<15	15-24	25-31	>31
50-51	0.00 %	0.00 %	40.00 %	40.00 %
52	0.00	0.00	35.00	40.00
53	0.00	0.00	32.50	32.50
54	0.00	22.50	27.50	32.50
55-58	0.00	22.50	22.50	32.50
59	0.00	22.50	22.50	42.50
60	10.00	22.50	27.50	42.50
61	17.00	22.50	32.50	42.50
62	17.00	30.00	32.50	42.50
63	17.00	25.00	32.50	42.50
64	17.00	25.00	37.50	42.50
65	30.00	32.50	40.00	42.50
66-69	25.00	32.50	40.00	42.50
70	100.00	100.00	100.00	100.00

C. Other Assumptions

1. Percent married: 90% of employees are assumed to be married.
2. Age difference: Male members are assumed to be three years older than their spouses, and female members are assumed to be three years younger than their spouses.
3. Unused Vacation and Compensatory Time: For Tier 1 and Tier 2 members, compensatory service credits and lump sum payments for unused vacation and compensatory time are assumed to increase the present value of normal retirement benefits by 9.0%. No increase to the present value of normal retirement benefits was assumed for Tier 3 members.
4. Member Contribution Crediting Rate: Member contributions are credited with interest at 3.75% per annum.

SECTION H

IMPACT OF ASSUMPTION CHANGES

The following shows the main actuarial valuation results as of June 30, 2017 before and after the changes to assumptions and benefits:

Exhibit H.1			
City of Phoenix Employees' Retirement System			
Impact of Assumption and Benefit Changes Effective June 30, 2017			
Fiscal Year Beginning	June 30, 2017	June 30, 2017	
	After Assumption Changes	Before Assumption Changes	Impact of Changes
1. Actuarial Accrued Liability	\$ 4,129,452,386	\$ 4,127,032,564	\$ 2,419,822
2. Actuarial Value of Assets	<u>2,402,707,329</u>	<u>2,402,707,329</u>	<u>-</u>
3. Unfunded Accrued Liability	\$ 1,726,745,057	\$ 1,724,325,235	\$ 2,419,822
4. Funded Ratio	58.2%	58.2%	0.0%
5. Normal Cost	\$ 78,755,065	\$ 80,550,422	\$ (1,795,357)
6. Administrative Expenses	391,511	391,511	-
7. Amortization of UAAL	<u>124,812,101</u>	<u>127,575,973</u>	<u>(2,763,872)</u>
8. Total Actuarially Determined Contribution	\$ 203,958,677	\$ 208,517,906	\$ (4,559,229)

Assumption changes effective June 30, 2017 are:

Assumption	Prior Value	New Value
Discount rate	7.50%	7.25%
Real return	4.50%	4.75%
Inflation	3.00%	2.50%
Payroll Growth	3.50%	3.00%
PER	1.50%	1.25%