

## **City of Phoenix Employees' Retirement System**

### **Actuarial Valuation Report as of June 30, 2015**

**Produced by Cheiron**

**November 2015**

## Table of Contents

<i>Section</i>	<i>Page</i>
Letter of Transmittal .....	i
Section I – Board Summary .....	1
Section II – Certification.....	13
Section III – Assets .....	14
Section IV – Funding Liability Measures .....	17
Section V – Contributions.....	23
Section VI – Accounting and Financial Reporting under GASB 67 and 68 .....	26
Section VII – Actuarial Section of the CAFR .....	36
 <i>Appendices</i>	
Appendix A – Membership Information.....	39
Appendix B – Actuarial Assumptions and Methods.....	49
Appendix C – Summary of Plan Provisions .....	56
Appendix D – Glossary of Terms .....	61

## LETTER OF TRANSMITTAL

November 17, 2015

Board of Retirement  
City of Phoenix Employees' Retirement System  
200 W. Washington Street, 10th Floor  
Phoenix, Arizona 85003

Dear Members of the Board:

The purpose of this report is to present the June 30, 2015 actuarial valuation of the City of Phoenix Employees' Retirement System (COPERS), including both information related to the funding of COPERS and accounting and financial disclosure information under the Governmental Accounting Standards Board Statements Nos. 67 and 68 (GASB 67 and 68). The sections of the report are as follows:

- Section I provides a summary containing our key findings, disclosing important trends experienced by the System in recent years, and providing analysis relating to the future status of the System.
- Section II is the actuarial certification of the valuation.
- Section III contains details on various asset measures, together with pertinent performance measurements.
- Section IV shows similar information on liability measures, including analysis of key changes.
- Section V develops the contribution rates for the City and members.
- Section VI includes financial reporting information under GASB 67 and 68.
- Section VII contains information needed for the Actuarial Section of the CAFR.

If you have any questions about the report or would like additional information, please let us know.

Sincerely,  
Cheiron



William R. Hallmark, ASA, FCA, EA, MAAA  
Consulting Actuary



Elizabeth Wiley, FSA, FCA, EA, MAAA  
Consulting Actuary

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

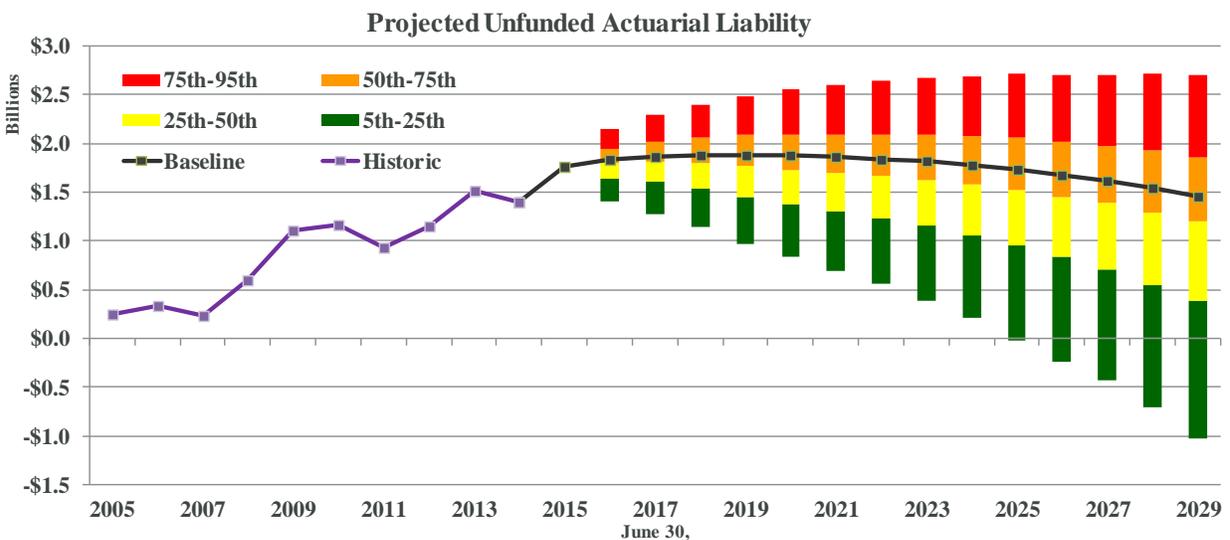
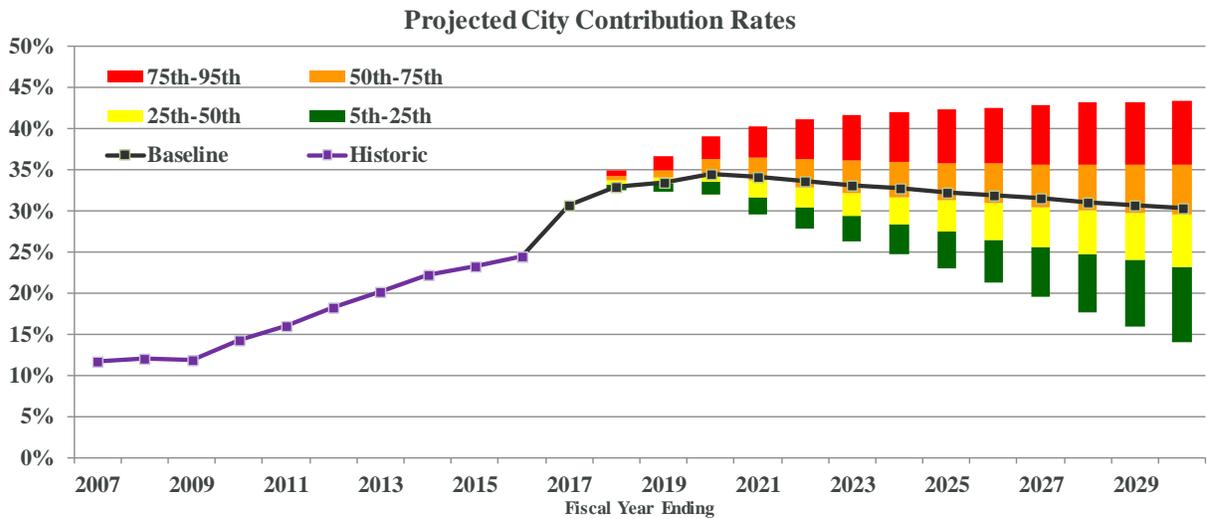
**SECTION I – BOARD SUMMARY**

Highlights of this report are summarized in the tables and graphs below.

<u>Contributions</u>			<b>Actuarial Liability</b>	<u>Funding Status</u>		
	Fiscal Year Ending			Valuation Date		
	2017	2016		6/30/2015	6/30/2014	
Tier 1 Member Rate	5.00%	5.00%		Actuarial Liability (AL)	\$ 3,976	\$ 3,615
Tier 2/3 Member Rate	11.00%	13.25% *		Market Value of Assets (MVA)	2,210	2,222
City Rate	30.60%	25.13%		<b>Unfunded AL - MVA</b>	<b>\$ 1,766</b>	<b>\$ 1,393</b>
				Funded Ratio - MVA	55.6%	61.5%
Normal Cost Rate	16.47%	14.91%		Actuarial Value of Assets (AVA)	2,203	2,121
Interest on MVA UAL	26.34%	20.51%		<b>Unfunded AL - AVA</b>	<b>\$ 1,773</b>	<b>\$ 1,494</b>
Additional UAL Rate	-6.21%	-4.41%		Funded Ratio - AVA	55.4%	58.7%
Total UAL Rate	20.12%	16.10%				
<b>Total Rate</b>	<b>36.59%</b>	<b>31.01%</b>				

*\* Adjusted for estimated impact of cap effective 1/1/2016*

*Amounts in Millions*



**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**SECTION I – BOARD SUMMARY**

**Assets and Liabilities**

This report measures assets and liabilities both for funding purposes and for financial reporting purposes. For many pension plans, the basis for these measures differs, but for the City of Phoenix Employees' Retirement System (COPERS), the measures are the same except for the use of a smoothed value of assets to develop contribution rates for funding purposes. Table I-1 below compares the assets, liabilities, unfunded actuarial liability (UAL), and funded ratios between June 30, 2015 and June 30, 2014.

<b>Table I - 1</b>			
<b>Assets And Liabilities</b>			
<b>Item</b>	<b>June 30, 2015</b>	<b>June 30, 2014</b>	<b>% Change</b>
<b>Actuarial Liability (AL)</b>			
Actives	\$ 1,442.8	\$ 1,459.0	-1.1%
Terminated Vesteds	67.2	56.5	19.0%
In Pay Members	2,465.9	2,099.3	17.5%
<b>Total AL</b>	<b>\$ 3,975.9</b>	<b>\$ 3,614.8</b>	<b>10.0%</b>
Market Value of Assets (MVA)	\$ 2,209.5	\$ 2,222.2	-0.6%
Actuarial Value of Assets (AVA)	\$ 2,202.9	\$ 2,120.7	3.9%
Unfunded AL (UAL) - MVA Basis	\$ 1,766.4	\$ 1,392.5	26.8%
UAL - AVA Basis	\$ 1,773.0	\$ 1,494.1	18.7%
Funded Ratio - MVA Basis	55.6%	61.5%	-9.6%
Funded Ratio - AVA Basis	55.4%	58.7%	-5.6%
Expected Payroll (Pay)	\$ 484.9	\$ 509.3	-4.8%
Asset Leverage Ratio (MVA/Pay)	4.6	4.4	4.4%
AL Leverage Ratio (AL/Pay)	8.2	7.1	15.5%
Interest on UAL - MVA Basis	\$ 132.5	\$ 104.4	26.8%
Interest Cost	27.3%	20.5%	33.2%

*Dollar amounts in millions*

For funding purposes, the actuarial liability (AL) represents the targeted amount of assets as of the valuation date based on the actuarial cost method. Shortfalls or surpluses in assets compared to the actuarial liability are made up over a period of time through increases or reductions in contributions. Since COPERS uses the same actuarial cost method for funding as is required by the Governmental Accounting Standards Board (GASB) for financial reporting and the discount

## SECTION I – BOARD SUMMARY

rate used for both purposes is also the same, the Total Pension Liability (TPL) under GASB Statement Nos. 67 and 68 is identical to the actuarial liability developed for funding.

As of June 30, 2015, approximately 62% of the actuarial liability is for members who are currently receiving benefits, increased from 58% in the prior valuation. The actuarial liability for active members decreased 1.1% while it increased for retirees by 17.5%. Payroll for active members also decreased by 4.8%. All of these changes contribute to make the payments on the unfunded actuarial liability (UAL) a larger percentage of payroll and to make contribution rates more sensitive to future gains and losses.

For financial reporting purposes under GASB Statement Nos. 67 and 68, the Plan's Fiduciary Net Position (FNP) is equal to the market value of assets (MVA) and the Net Pension Liability (NPL) is equal to the UAL based on that FNP. On this basis, the COPERS funded ratio decreased from 61.5% as of June 30, 2014 to 55.6% as of June 30, 2015. The NPL increased from \$1.39 billion to \$1.77 billion over this same period.

For funding purposes, COPERS calculates an actuarial value of assets (AVA) that recognizes gains and losses compared to the expected investment returns over a four-year period. For this year, the investment return on the AVA was 6.8% compared to a 2.2% return on the MVA. The ratio of the AVA to the MVA increased from 95.4% to 99.7%. Also over this year, the UAL based on the AVA increased from \$1.49 billion to \$1.77 billion; and, the funded ratio based on AVA decreased from 58.7% to 55.4%.

The asset leverage ratio is calculated as the MVA divided by payroll and measures the sensitivity of COPERS funding to investment gains and losses. A ratio of 4.6 means that a 10% investment loss (relative to the assumed rate of return) is equivalent to a loss of 46% of payroll. The actuarial liability leverage ratio shows what the asset leverage ratio would be if COPERS was 100% funded. The increase from 7.1 to 8.2 is partly the normal progression as a plan matures, but the growth is larger this year reflecting the reduction in active payroll and assumption changes from the experience study.

The interest cost on the UAL ( $7.5\% \times \text{UAL} \div \text{payroll}$ ) has increased from 20.5% of payroll to 26.3% of payroll over the last year. Since the UAL payments for FYE 2016 and 2017 are less than the interest on the UAL, the UAL is expected to grow during these periods. Once the amortization payments on the assumption changes are fully phased-in and the amortization periods shorten, the UAL payment will exceed the interest cost and the current UAL is expected to be paid off in 23 years.

Despite the tendency to focus on the most recent valuation results, it is important to remember that each valuation is merely a snapshot of the long-term progress of the System. The results of the current year's valuation should thus be evaluated in the context of historical trends, as well as trends expected in the future for a better understanding of the status of the System.

Chart I-1 on the next page shows the historical trends and expected projections for assets (both MVA and AVA) and actuarial liability (AL) as well as funded ratios, developed on the basis of the smoothed AVA values. The historical trends are shown since 2005 and the projected values

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**SECTION I – BOARD SUMMARY**

are shown for the next fifteen years assuming that all actuarial assumptions are exactly met. From 2007 to 2015, the funded ratio has declined with most of the decrease attributable to the stagnation in the assets since 2008 combined with the significant increase in liabilities due to assumption changes in 2013 and 2015. The smoothed AVA spread the investment losses from 2008-2009 over four years, but now those losses have been fully recognized and the MVA, the blue line, is virtually identical to the smoothed value of assets, the green line. During the projection period, the two asset values do not show deviation due to the assumption within this projection that all actuarial assumptions are exactly met, including the investment rate of return. The projections show growth in the funded ratio as contributions pays off the existing UAL, with the AVA funded ratio expected to increase from the current 55% to 79% over the 15-year projection period shown.

**Chart I-1: Historical and Deterministic Projected Assets and Liabilities**

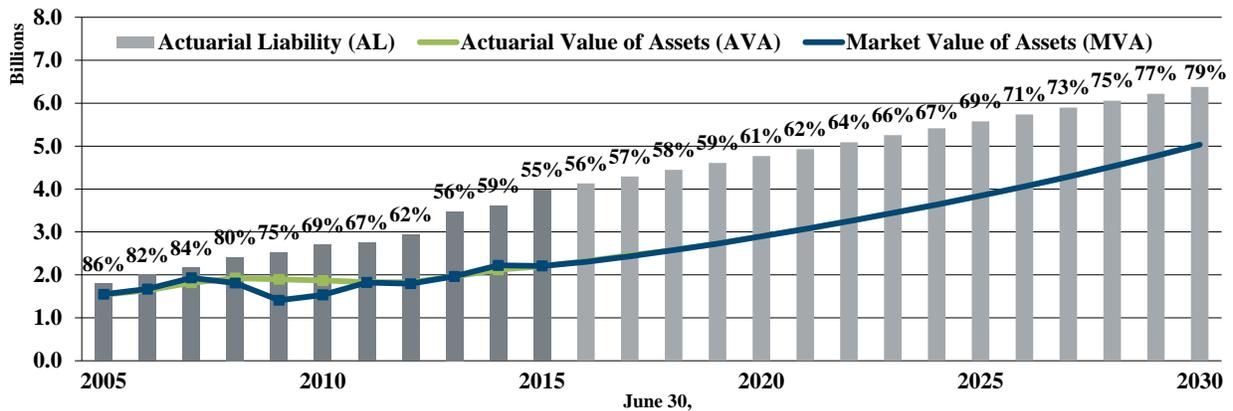
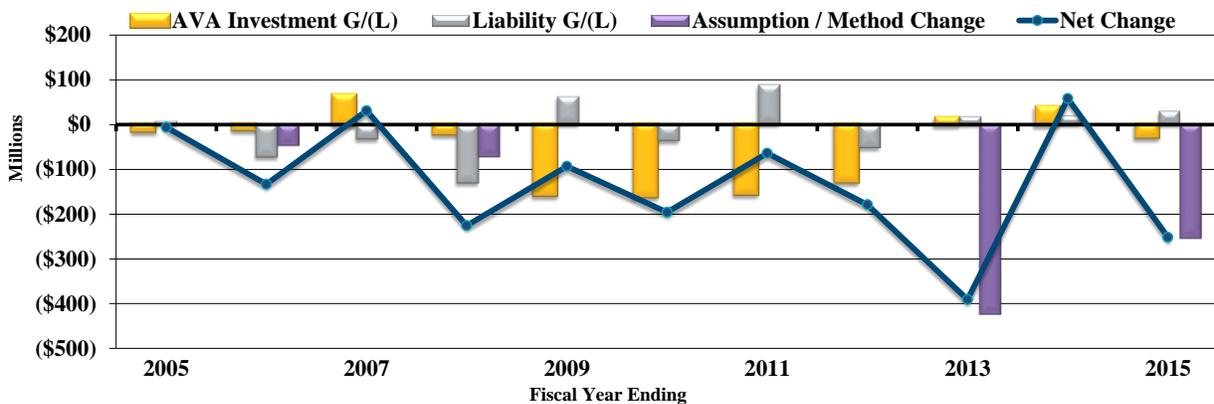


Chart I-2 below shows historical changes in UAL for COPERS, broken into investment gains and losses on the actuarial value of assets, liability gains and losses, and assumption changes.

**Chart I-2: Sources of Historical Gains, Losses and Assumption Changes**



The investment losses (gold bars) from 2009 through 2012 contributed significantly to the increase in the UAL. On the liability side, experience since 2009 has been relatively balanced

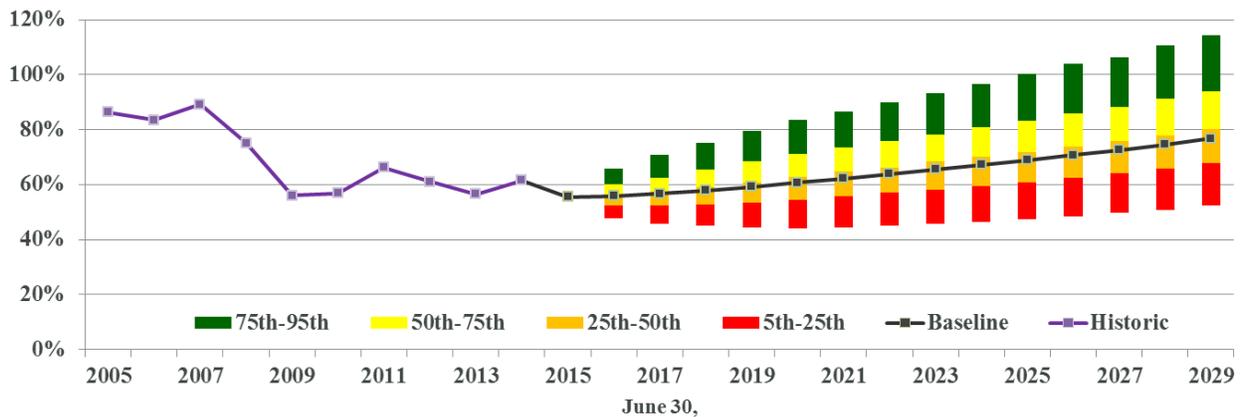
**SECTION I – BOARD SUMMARY**

between gains and losses while experience prior to 2009 appears to have been dominated by losses. The assumption changes in 2013, including the recognition of a liability for future Pension Equalization Reserve payments and a reduction in the discount rate, significantly increased the measure of the UAL. The assumption changes adopted in 2015 also had a net effect of increasing the UAL, driven by projected improvements in mortality and other changes to the demographic assumptions.

If experience has taught us anything, it is that there is a significant level of uncertainty in projections of the future. The largest source of uncertainty is the projection of investment returns. In order to better understand the potential impact of investment returns on COPERS, we have included stochastic projections throughout this report based on the assumed rate of return of 7.50% with Meketa’s estimated standard deviation of 10.74%. Each projection contains 10,000 trials that are 15 years in length.

Chart I-3 below shows historic and a stochastic projection of MVA funded ratios. The black line shows the projected funded ratio for each year if all assumptions are met. The colored ranges represent different percentiles of the 10,000 results. For example, the red range represents the 5<sup>th</sup> through 25<sup>th</sup> percentile of funded ratios for each year seen among the 10,000 trials. Based on the assumed distribution investment returns, there is a 5% chance the result will be worse than the red range and a 5% chance that the result will be better than the green range.

**Chart I-3: Historic and Stochastic Projected MVA Funded Ratios**



**Membership**

As shown in Table I-2 on the following page, total membership grew 1.4% from 2014 to 2015, with significant changes within membership categories. Active membership decreased 3.5%, terminated vested membership increased 10.4%, and members currently in payment increased 6.3%. Total payroll decreased by 4.8%, while the average pay per active member decreased by 1.4%. These changes explain, in part, the changes in the liability measurement and the changes in calculated contribution rates. For example, the reduction in active actuarial liability is primarily due to the reduction in the number of active members, and the calculated total

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**SECTION I – BOARD SUMMARY**

contribution rate (not amount) is higher than it would have been as it is based on a reduced total active payroll.

<b>Table I - 2</b>			
<b>Total Membership</b>			
<b>Item</b>	<b>June 30, 2015</b>	<b>June 30, 2014</b>	<b>% Change</b>
<b>Active Members</b>			
Tier 1	6,741	7,421	-9.2%
Tier 2	<u>722</u>	<u>310</u>	132.9%
Total	7,463	7,731	-3.5%
Terminated Vesteds	901	816	10.4%
<b>In Pay Members</b>			
Service Retirees	5,419	5,080	6.7%
Disabled Retirees	251	249	0.8%
Beneficiaries	<u>1,018</u>	<u>961</u>	5.9%
Total	6,688	6,290	6.3%
Total Members	15,052	14,837	1.4%
<b>Active Member Payroll</b>			
Actual for Prior Year	\$ 460.4	\$ 485.2	-5.1%
Projected for Upcoming Year	\$ 484.9	\$ 509.3	-4.8%
<b>Average Pay per Active Member</b>			
Projected for Upcoming Year	\$ 64,968	\$ 65,873	-1.4%
Annuities Currently In Pay	\$ 208	\$ 189	9.8%

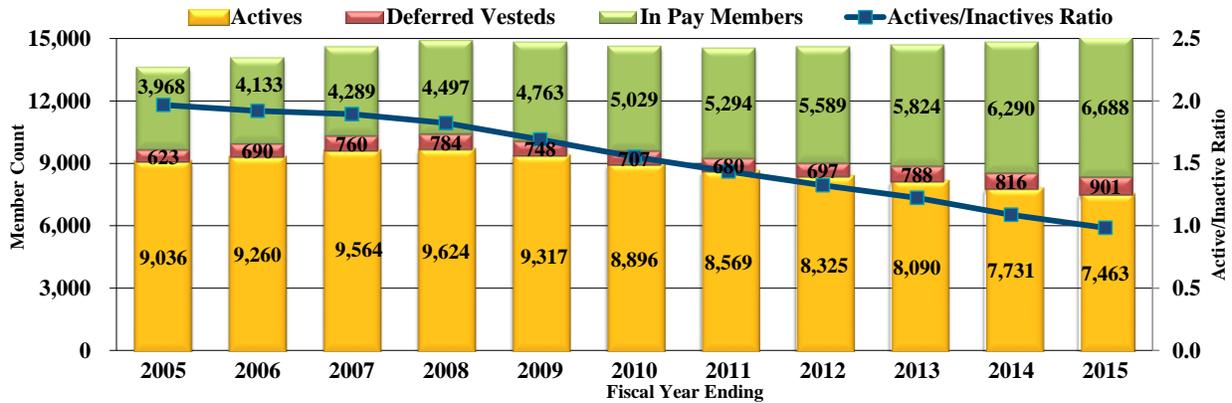
*Payroll and annuity amounts in millions*

Chart I-4 on the next page puts the membership trends in some historical perspective. The number of active members has declined over 20 percent since 2008, while the number of members receiving benefits has increased almost 50 percent during the same period. There are now approximately equal numbers of active and inactive (those currently receiving benefits plus terminated vested members) members, making the System more sensitive to changes as any gain or loss on inactive members is now spread over the payroll of fewer active members than it would have been in the past. The blue line illustrates the relative size of these two groups, showing the trend of the ratio of active members to inactive members, declining from 2.0 in 2005 to 1.0 in 2015.

CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015

SECTION I – BOARD SUMMARY

**Chart I-4: Historical Changes in Member Counts**



### Contribution Rates

The total annual contribution rate, referred to in the City Charter as the Projected Percentage, equals the sum of the normal cost rate, the administrative expense rate, and the amortization payment on the UAL expressed as a percentage of total annual compensation. Normal cost rates are calculated separately for Tier 1, Tier 2, and Tier 3 members. The normal cost rates by Tier are then combined as a weighted average based on the projected annual compensation for each Tier for the fiscal year to which the rates apply to develop the normal costs rate for COPERS as a whole.

The administrative expense rate is assumed to be 0.07% of total annual compensation.

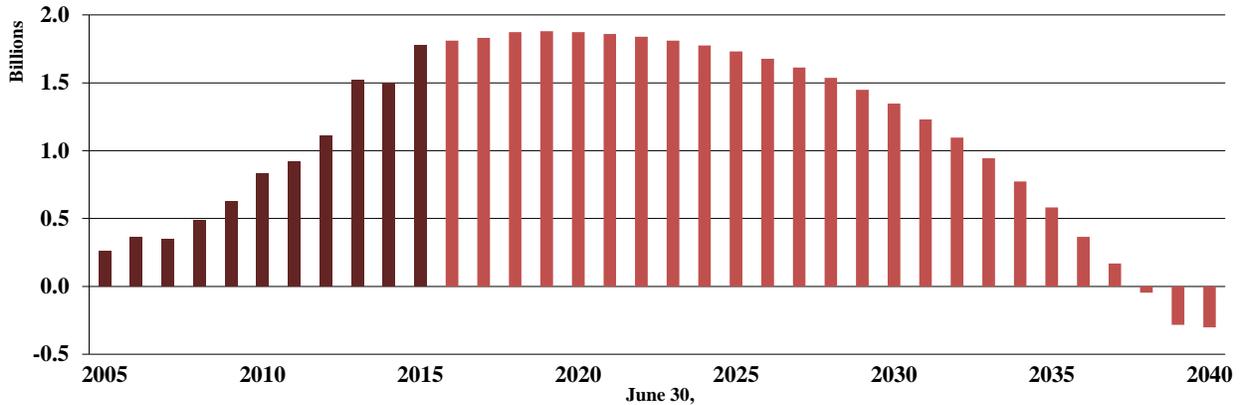
The UAL rate for the fiscal year ending (FYE) 2017, determined by this June 30, 2015 actuarial valuation, consists of separate components for the UAL as of June 30, 2013 before assumption changes, the gains and losses for each year since 2013, and the assumption changes in 2013 and 2015. There are 23 years remaining on the amortization period for all current components, except the 2015 assumption changes that has 20 years remaining on its amortization. All current components are amortized as a level percentage of payroll assuming 3.5% increases in total annual compensation each year. The amortization of the September 2013 assumption changes, however, is in the third year of a four-year phase-in to the full amortization rate, so the payment on the amortization of these assumption changes is currently three-quarters of what it would be without the phase-in. Additionally, the amortization of the June 30, 2015 assumption changes is in the first year of a four-year phase-in to the full amortization rate, so the payment on the amortization of these assumption changes is one-quarter of what it would be without the phase-in.

Chart I-5 on the following page shows the historical UAL and its projected decline as payments are made based on these amortization schedules.

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**SECTION I – BOARD SUMMARY**

**Chart I-5: Historic and Deterministic Projected Unfunded Actuarial Liability**



This amortization structure results in a total UAL rate of 20.1% of payroll for FYE 2017, which is less than the amount needed to pay the interest cost on the UAL (26.3% of payroll). As a result, the dollar amount of the UAL is expected to increase in the short term as shown in the chart above. As the phase-in of the bases for the assumption changes are completed and the remaining amortization periods shorten, the UAL rate will exceed the interest cost on the UAL and pay off the principal and interest in 23 years.

Chart I-6 below shows the historic and stochastically projected unfunded actuarial liability based on AVA. While the amortization methods are designed to pay off the entirety of the current UAL in 23 years, the stochastic projection shows that there is a 5% chance that it will be paid off in as early as 10 years. It also shows, however, that the UAL could be more than \$2.5 billion in 10 years.

**Chart I-6: Historic and Stochastic Projected Unfunded Actuarial Liability**

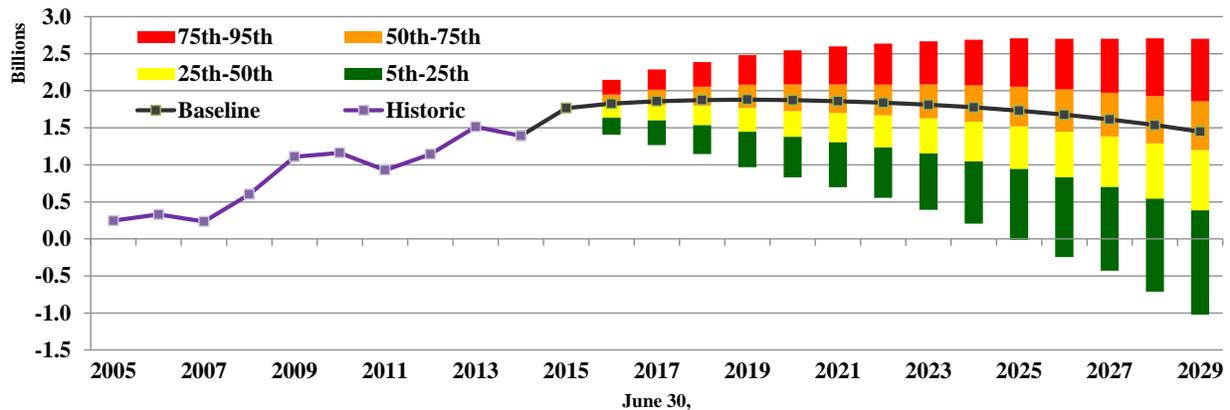
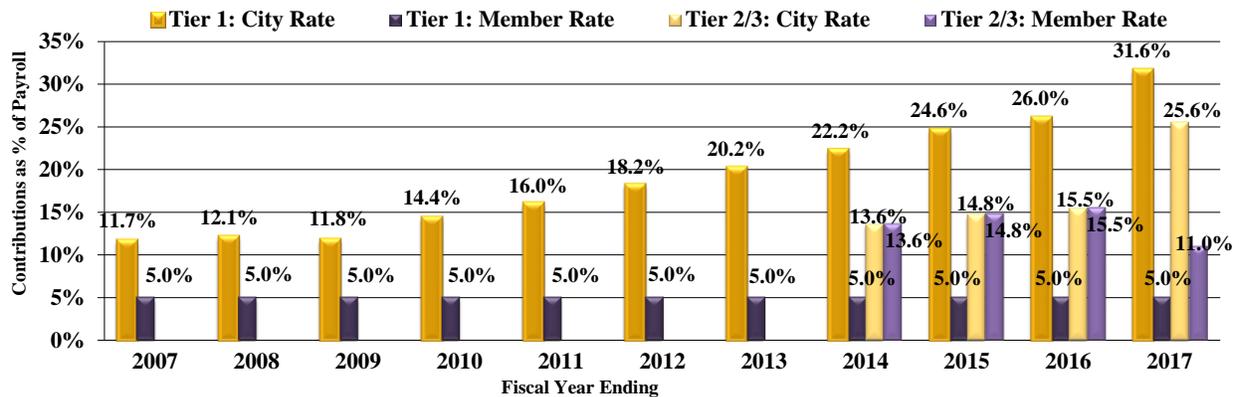


Chart I-7 on the next page shows historical contribution rates by tier from FYE 2007 through 2017. Note that there is a lag between the actuarial valuations and the contribution rates they develop such that these rates were developed by the June 30, 2005 through the June 30, 2015 actuarial valuations. There has been a steady increase in the City’s contribution rate as the UAL

**SECTION I – BOARD SUMMARY**

has grown throughout this period. With the implementation of Tier 2, it was thought that new members would help shoulder a significant portion of the increased contribution rates. However, the recent ballot measure capped the contribution rates for Tier 2 and Tier 3 members at 11%. In the short-term, this cap shifts the some of the burden back to the City, but the lower normal cost rates for Tier 3 members compared to Tier 2 are eventually expected to help reduce City contributions compared to those expected prior to the ballot measure.

**Chart I-7: Historic Contribution Rates by Tier**



For Tier 1, members contribute 5.0% of payroll, and the City contributes the remainder of the Projected Percentage (31.59%). Effective January 1, 2016, Tier 2 and Tier 3 member contributions are half of the Projected Percentage, capped at 11.0%, with the City contributing the remainder (25.59% for FYE 2017). Based on expected Tier 1 payroll of approximately \$419 million, expected Tier 2 payroll of approximately \$50 million, and expected Tier 3 payroll of approximately \$32 million for FYE 2017, we expect the City’s aggregate contribution rate to be approximately 30.6% of payroll.

Chart I-8 on the following page shows historic and projected aggregate member contribution rates (purple bars) and City contribution rates (gold bars) compared to the projection of member plus City contributions from the prior valuation, indicated by the red line. If all actuarial assumptions are exactly met, the City contribution rates are expected to increase from approximately 31% in FYE 2017 to approximately 35% in FYE 2020 as the impact of the assumption changes is phased in. Then, City contribution rates are expected to decline gradually to 30% by FYE 2032 as Tier 3 grows. Aggregate member contribution rates are projected to increase gradually over the projection period as Tier 1 member who contribute 5% leave the workforce and are replaced by Tier 3 members who contribution 50% of the Projected Percentage up to 11% of pay. Since the member contribution cap was implemented, the increase in member contribution rates is much lower than in the projections from the prior valuation. The projected total contribution rates, the Projected Percentage values, are higher than the projections from the prior valuation primarily due to the decrease in payroll. However, unlike the prior projections, after reaching a peak rate once the amortization phase-in is complete in 2020, the Projected Percentage gradually decreases due to projected growth of Tier 3 with its lower City normal cost rate as a proportion of the total population.

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**SECTION I – BOARD SUMMARY**

Chart I-8 also shows the City normal cost rate for the all COPERS actives with the black line. The projections show that this amount is expected to decline as more Tier 3 members enter the plan, replacing primarily Tier 1 members with a higher City normal cost.

**Chart I-8: Historic and Deterministic Projected Contribution Rates**

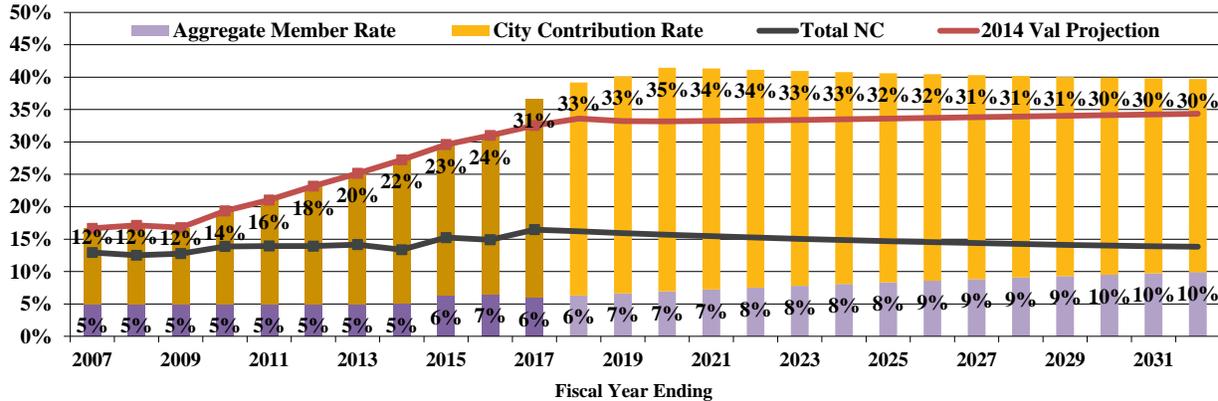


Table I-3 below shows the primary sources for the change in the Projected Percentage from the rate that was calculated in the prior report. While the rate was expected to increase, primarily due to the phase-in of the amortization of the 2013 assumption changes, additional increases were caused by the reduction in payroll and the assumption changes. Investment and demographic experience roughly offset each other. The plan changes item represents the impact of the addition of Tier 3 beginning January 1, 2016 on the aggregate normal cost rate.

<b>Table I - 3</b>			
<b>Reconciliation of Changes In Contribution Rates</b>			
	<b>Total Normal Cost<sup>1</sup></b>	<b>UAL Rate</b>	<b>Projected Percentage</b>
FYE 2016 Projected Percentage	14.91%	16.10%	31.01%
Expected FYE 2017 Projected Percentage	14.97%	17.66%	32.63%
<b><u>Changes Due to:</u></b>			
Reduction in total payroll	0.00%	1.54%	1.54%
Investment experience	0.00%	0.38%	0.38%
Demographic experience	-0.01%	-0.42%	-0.43%
Assumption changes	1.51%	0.95%	2.46%
Plan changes	-0.36%	0.00%	-0.36%
<b>FYE 2017 Projected Percentage</b>	<b>16.47%</b>	<b>20.12%</b>	<b>36.59%</b>

<sup>1</sup> Includes administrative expenses and employee contributions

Dollar amounts in millions

**SECTION I – BOARD SUMMARY**

Chart I-9 below shows historic and stochastically projected aggregate City contribution rates. The black line shows the projected contribution rate for each year if all assumptions are met. The colored ranges represent different percentiles of the 10,000 trials. While the City's contribution rate is expected to decline over time, there is significant uncertainty depending on investment returns. As noted above, the downward trend relies on a growing Tier 3 population with lower normal cost rates.

**Chart I-9: Historic and Stochastic Projection of City Contribution Rates**

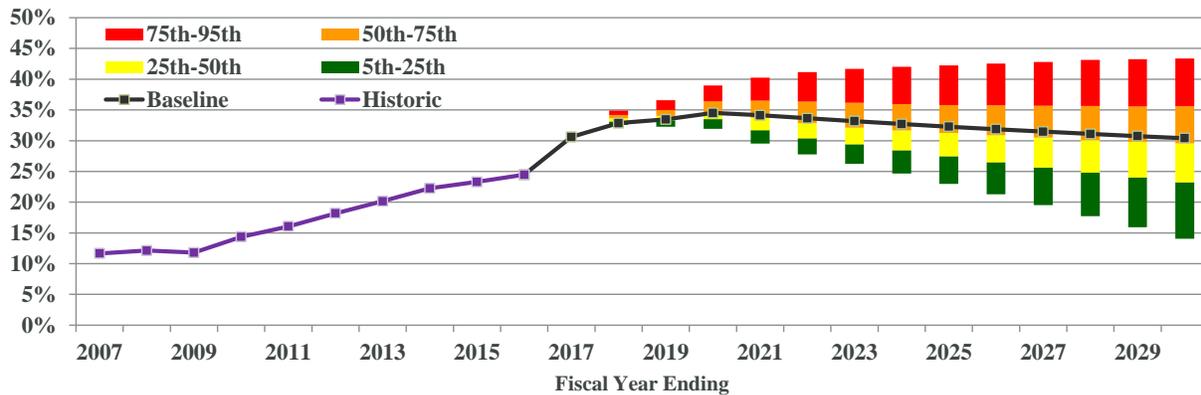
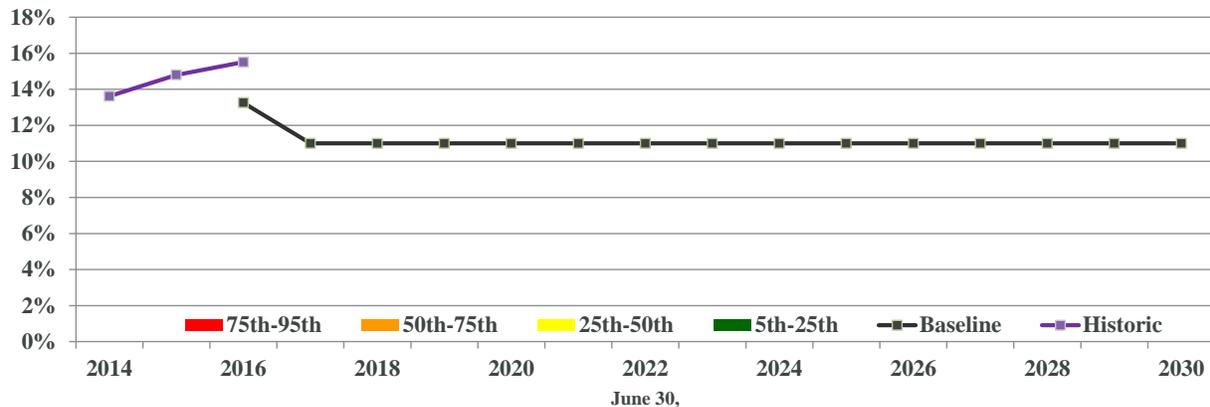


Chart I-10 below shows historic and stochastically projected Tier 2/Tier 3 member contribution rates. As noted above, these contribution rates are half of the Projected Percentage, but effective January 1, 2016, capped at 11%. The black line in the chart shows the projected contribution rate for each year if all assumptions are met. The lack of colored ranges representing different percentiles of the 10,000 results indicates that the projected rate is expected to equal the cap of 11% for all trials between the 5<sup>th</sup> and 95<sup>th</sup> percentile for all years in the projection. However, after the current UAL is paid off, it is expected that these rates will drop below this level, eventually to the level of one-half of the Tier 3 total normal cost rate, 6.5%.

**Chart I-10: Historic and Stochastic Projection of Tier 2/3 Member Contribution Rates**



**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**SECTION I – BOARD SUMMARY**

Chart I-11 below shows historic and projected member (purple bars) and City (gold bars) contribution amounts compared to the projected amounts shown in the prior valuation. If all actuarial assumptions are exactly met, City contributions are expected to increase from \$154 million in FYE 2017 to approximately \$192 million in FYE 2020, reflecting the phase-in of the impact of the assumption changes and the expected growth in payroll. The contribution amount is expected to increase after that at a rate lower than payroll growth as member contributions are expected to increase more rapidly than payroll as primarily Tier 1 members are replaced by Tier 3 members.

**Chart I-11: Historic and Deterministic Projection of Contribution Amounts**

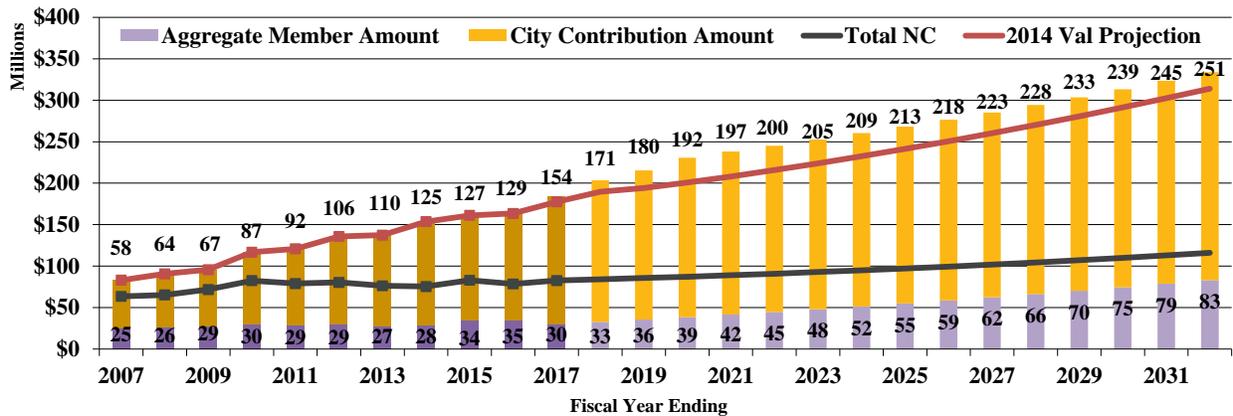
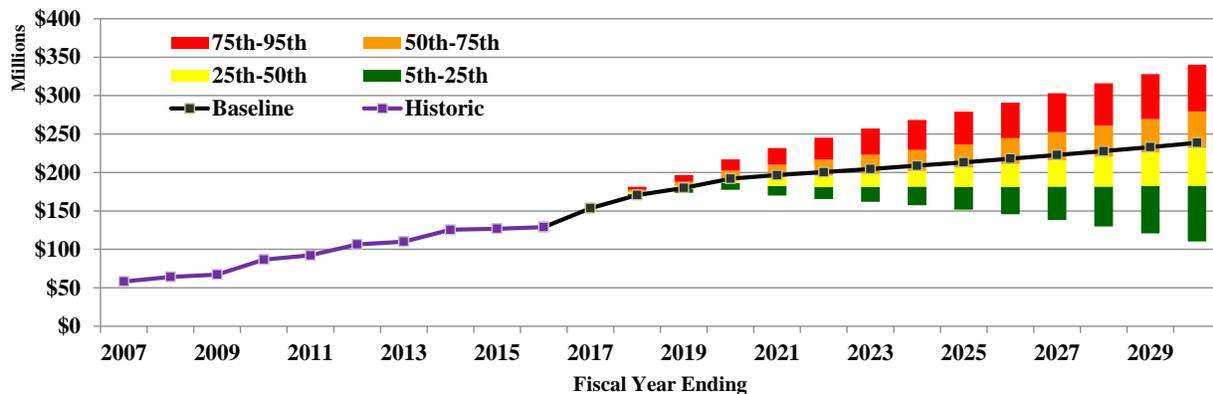


Chart I-12 below shows the historic and stochastic projection of City contribution amounts. The black line shows the projected contribution amount for each year if all assumptions are met. The colored ranges represent different percentiles of the 10,000 results. There is significant uncertainty in the level of City contributions depending on investment returns.

**Chart I-12: Historic and Stochastic Projection of City Contribution Amounts**



**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**SECTION II – CERTIFICATION**

The purpose of this report is to present the results of the June 30, 2015 actuarial valuation for the City of Phoenix Employees' Retirement System (COPERS). This report is for the use of COPERS and the City of Phoenix and their respective auditors in preparing financial reports in accordance with applicable law and accounting requirements.

In preparing our report, we relied on information, some oral and some written, supplied by the System. This information includes, but is not limited to, the plan provisions, membership data, and financial information. We performed an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standard of Practice No. 23.

The assumptions used in this valuation were adopted by the Board in August 2015 based on our recommendations and the experience study covering the period from July 1, 2009 through June 30, 2014 with the exception of the mortality assumptions, which were adopted by the Board in October 2015.

The funded ratios in this report are for the purpose of establishing contribution rates and for meeting financial reporting requirements under GASB 67 and 68. These measures are not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations.

Future actuarial measurements may differ significantly from the current measurements 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; and, changes in plan provisions or applicable law.

To the best of our knowledge, this report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices that are consistent with the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board. The schedules provided for financial reporting purposes have been prepared in accordance with our understanding of generally accepted accounting principles as promulgated by the GASB. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys and our firm does not provide any legal services or advice.

This report was prepared for the System for the purposes described herein and for the use by the plan auditor in completing an audit related to the matters herein. Other users of this report are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to any other user.

William R. Hallmark, ASA, FCA, EA, MAAA  
Consulting Actuary

Elizabeth Wiley, FSA, FCA, EA, MAAA  
Consulting Actuary

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**SECTION III – ASSETS**

COPERS uses and discloses two different asset measurements that are presented in this section of the report: market value and actuarial value. The market value represents, as of the valuation date, the value of the assets if they were liquidated on that date. The actuarial value of assets for COPERS is a value that smoothes annual investment returns over four years to reduce the impact of short-term investment volatility on contribution rates. The market value of assets is used primarily for reporting and disclosure, and the actuarial value of assets is used primarily to determine contribution rates.

This section shows the changes in the market value of assets and develops the actuarial value of assets.

**Statement of Changes in the Market Value of Assets**

Table III-1 shows the changes in the market value of assets for the current and prior fiscal years.

<b>Table III - 1</b>		
<b>Changes In Market Value Of Assets</b>		
	<b>FYE 2015</b>	<b>FYE 2014</b>
Market Value, Beginning of Year	\$ 2,222,241,522	\$ 1,965,621,678
Contributions		
Member	\$ 27,860,787	\$ 27,760,382
City	117,092,059	110,629,381
Inter-System Transfers	199,341	160,061
Total	<u>\$ 145,152,187</u>	<u>\$ 138,549,824</u>
Net Investment Earnings	\$ 47,148,320	\$ 298,575,764
Disbursements		
Benefit Payments	\$ (204,181,254)	\$ (179,639,188)
Inter-System Transfers	(420,926)	(238,119)
Administrative Expenses	(414,217)	(628,437)
Total	<u>\$ (205,016,397)</u>	<u>\$ (180,505,744)</u>
Market Value, End of Year	\$ 2,209,525,632	\$ 2,222,241,522
Net Cash Flow as % of Assets	-2.7%	-2.1%
Estimated Rate of Return	2.2%	15.4%

The net investment earnings for the year ended June 30, 2015 represent approximately a 2.2% return on the market value of assets compared to an assumed return of 7.5%. For the year ended June 30, 2014, the net investment return on the market value of assets was approximately 15.4%.

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**SECTION III – ASSETS**

**Actuarial Value of Assets**

To determine ongoing contribution amounts, COPERS uses an actuarial value of assets that smoothes year-to-year market value returns in order to reduce the volatility of resulting contribution rates.

The actuarial value of assets for COPERS is calculated by recognizing the difference between actual investment returns and the expected return (7.50%) on the prior year's actuarial value of assets over a four-year period. Any difference between the expected return and the actual net investment earnings is considered a gain or loss. Table III-2 below shows the calculation of the actuarial value of assets, including increases for actual contributions and expected earnings, reductions for actual benefit payments and administrative expenses, and recognition of 25 percent of the gains and losses for the last four years. The gain and loss amounts not recognized in the current year will be recognized in future years.

<b>Table III - 2</b>		
<b>Development Of Actuarial Value Of Assets</b>		
	<b>FYE 2015</b>	<b>FYE 2014</b>
1. Actuarial Value of Assets, Beginning of Year	\$ 2,120,700,320	\$ 1,962,532,556
2. Net Cash Flow	(59,864,210)	(41,955,920)
3. Expected Return	156,848,200	145,645,038
4. Actual Return	47,148,320	298,575,764
5. Current Year Gain / (Loss) [ 4. - 3. ]	(109,699,880)	152,930,726
6. Gains / (Losses)		
a. Current Year	\$ (109,699,880)	\$ 152,930,726
b. Prior Year	152,930,726	49,647,635
c. 2nd Prior Year	49,647,635	(151,922,641)
d. 3rd Prior Year	<u>(151,922,641)</u>	<u>167,258,865</u>
e. Total	\$ (59,044,160)	\$ 217,914,585
7. Phase-In Amount [25% of 6.e.]	\$ (14,761,040)	\$ 54,478,646
8. Actuarial Value of Assets, End of Year [1. + 2. + 3. + 7.]	\$ 2,202,923,270	\$ 2,120,700,320
9. Estimated Rate of Return	6.8%	10.3%
10. Ratio of Actuarial to Market Value of Assets	99.7%	95.4%

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**SECTION III – ASSETS**

On the basis of the smoothed actuarial value of assets, the return for the year ending June 30, 2015 was approximately 6.8%, less than the assumed return of 7.5%, but more than the return on the market value of assets. The ratio of the actuarial value of assets to the market value of assets has grown from 95.4% as of June 30, 2014 to 99.7% as of June 30, 2015. The current ratio is approximately 100%, meaning that there are essentially no stored gains or losses remaining in the actuarial value of assets.

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**SECTION IV – FUNDING LIABILITY MEASURES**

This section presents detailed information on liability measures for COPERS for funding purposes, including:

- Present value of future benefits,
- Actuarial liability,
- Normal cost, and
- Analysis of changes in the unfunded actuarial liability during the year.

**Present Value of Future Benefits**

The present value of future benefits represents the expected amount of money needed today under current assumptions to pay all benefits both earned as of the valuation date and those to be earned in the future by current plan members under the current plan provisions. Table IV-1 below shows the present value of future benefits as of June 30, 2015 and June 30, 2014. The amounts as of June 30, 2015 are split between Tier 1 and Tier 2 as well as showing the total. The first Tier 3 members will enter beginning January 1, 2016, so they are not yet included in the liability measure.

<b>Table IV - 1</b>				
<b>Present Value Of Future Benefits</b>				
	<b>June 30, 2015</b>			<b>June 30, 2014</b>
	<b>Tier 1</b>	<b>Tier 2</b>	<b>Total</b>	<b>Total</b>
<b>Actives</b>				
Retirement	\$ 1,833,178	\$ 54,521	\$ 1,887,700	\$ 1,724,606
Termination	96,663	15,857	112,520	122,378
Death	24,169	1,473	25,642	45,141
Disability	29,719	1,786	31,505	82,205
<b>Total Actives</b>	<b>\$ 1,983,730</b>	<b>\$ 73,637</b>	<b>\$ 2,057,367</b>	<b>\$ 1,974,330</b>
<b>In Pay Status</b>				
Service Retirees	\$ 2,241,352	\$ 0	\$ 2,241,352	\$ 1,903,735
Disabled Retirees	46,227	0	46,227	44,454
Beneficiaries	178,283	0	178,283	151,086
<b>Total</b>	<b>\$ 2,465,862</b>	<b>\$ 0</b>	<b>\$ 2,465,862</b>	<b>\$ 2,099,274</b>
Deferred Vested	\$ 66,941	\$ 265	\$ 67,206	\$ 56,461
<b>Total</b>	<b>\$ 4,516,534</b>	<b>\$ 73,902</b>	<b>\$ 4,590,436</b>	<b>\$ 4,130,066</b>

*Amounts in Thousands*

**SECTION IV – FUNDING LIABILITY MEASURES**

**Normal Cost**

Under the entry age (EA) actuarial cost method, the present value of future benefits for each individual is spread over the individual's expected working career under the System as a level percentage of the individual's expected pay. The normal cost rate is determined by dividing the value, as of entry age into the System, of each member's projected future benefits by the value, also at entry age, of the member's expected future salary. The normal cost rate is multiplied by the member's current salary to determine each member's normal cost at the valuation date. The normal cost of the System is the sum of the normal costs for each individual in the System. The normal cost represents the expected amount of money needed to fund the benefits attributed to the next year of service under the EA method.

Table IV-2 below shows the total EA normal cost as of June 30, 2015 and June 30, 2014 for Tier 1 members.

<b>Table IV - 2</b>		
<b>Tier 1 Entry Age Normal Cost</b>		
	<b>June 30, 2015</b>	<b>June 30, 2014</b>
Tier 1 Normal Cost		
Retirement	\$ 57,215,620	\$ 49,382,902
Termination	8,257,326	10,884,655
Death	1,419,988	2,204,626
Disability	1,683,415	3,792,802
Total Tier 1 Normal Cost	<u>\$ 68,576,349</u>	<u>\$ 66,264,985</u>
Expected Tier 1 active payroll	\$ 416,246,437	\$ 453,632,159
Tier 1 Normal Cost Rate	16.47%	14.61%

The changes in assumptions based on the experience study completed in 2015, particularly the updated mortality and termination assumptions, resulted in significant changes in this normal cost rate.

Table IV-3 on the following page shows the total EA normal cost as of June 30, 2015 and June 30, 2014 for Tier 2 members.

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**SECTION IV – FUNDING LIABILITY MEASURES**

<b>Table IV - 3</b>				
<b>Tier 2 Entry Age Normal Cost</b>				
	<b>June 30, 2015</b>		<b>June 30, 2014</b>	
Tier 2 Normal Cost				
Retirement	\$	4,576,378	\$	1,407,636
Termination		1,217,837		672,335
Death		127,691		90,475
Disability		141,182		138,185
Total Tier 2 Normal Cost	\$	<u>6,063,088</u>	\$	<u>2,308,631</u>
Expected Tier 2 active payroll	\$	32,539,956	\$	13,607,103
Tier 2 Normal Cost Rate		18.63%		16.97%

In addition to changes in this rate due to the assumption changes adopted following the 2015 experience study, rates for this tier are also subject to volatility due to the small size of this group. As this tier will be closed with the addition of Tier 3 as of January 1, 2016, we anticipate continued volatility within this rate.

As of the June 30, 2015 valuation, there are no actual Tier 3 employees in the data. In order to estimate the Tier 3 normal cost rate, a hypothetical set of employees with demographic characteristics identical to Tier 1 and Tier 2 employees were valued as if they were Tier 3 employees. The normal cost rate for the hypothetical Tier 3 employees is 13.06%. The lower normal cost rate for Tier 3 members is primarily due to the lower multipliers, no future PER COLA, and capped member contribution rates resulting in lower refund benefits.

The normal cost rates for the individual tiers are combined based on the expected payroll for each tier for the fiscal year to which contribution rates apply to determine an aggregate normal cost rate for COPERS. Table IV-4 below shows the projected payroll, projected normal cost, and total normal cost rate for the fiscal year ending June 30, 2017.

<b>Table IV - 4</b>			
<b>Aggregate Normal Cost Rate for FYE 2017</b>			
	<b>Projected Payroll</b>	<b>Projected Normal Cost</b>	<b>Projected Normal Cost Rate</b>
Tier 1	\$ 419,248,797	\$ 68,706,634	16.39%
Tier 2	50,131,375	9,340,853	18.63%
Tier 3	<u>32,442,795</u>	<u>4,235,874</u>	<u>13.06%</u>
Total	\$ 501,822,967	\$ 82,283,360	16.40%

In addition to these normal cost rates, there is also an administrative expense rate of 0.07% of annual compensation for each of the tiers.

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**SECTION IV – FUNDING LIABILITY MEASURES**

**Actuarial Liability**

The actuarial liability represents the expected amount of money needed today to pay for benefits attributed to service prior to the valuation date under the entry age (EA) actuarial cost method. It is essentially a funding target. The difference between the actuarial liability and the actuarial value of assets is the unfunded actuarial liability. Table IV-5 below shows the actuarial liability as of June 30, 2015 and June 30, 2014.

<b>Table IV - 5</b>				
<b>Actuarial Liability</b>				
	<b>June 30, 2015</b>			<b>June 30, 2014</b>
	<b>Tier 1</b>	<b>Tier 2</b>	<b>Total</b>	<b>Total</b>
<b>Actives</b>				
Retirement	\$ 1,379,865	\$ 4,539	\$ 1,384,404	\$ 1,346,265
Termination	28,077	752	28,829	31,000
Death	13,434	90	13,524	28,311
Disability	15,976	107	16,082	53,473
<b>Total Actives</b>	<b>\$ 1,437,352</b>	<b>\$ 5,488</b>	<b>\$ 1,442,839</b>	<b>\$ 1,459,048</b>
<b>In Pay Status</b>				
Service Retirees	\$ 2,241,352	\$ 0	\$ 2,241,352	\$ 1,903,735
Disabled Retirees	46,227	0	46,227	44,454
Beneficiaries	178,283	0	178,283	151,086
<b>Total</b>	<b>\$ 2,465,862</b>	<b>\$ 0</b>	<b>\$ 2,465,862</b>	<b>\$ 2,099,274</b>
Deferred Vested	\$ 66,941	\$ 265	\$ 67,206	\$ 56,461
<b>Total Actuarial Liability</b>	<b>\$ 3,970,155</b>	<b>\$ 5,753</b>	<b>\$ 3,975,908</b>	<b>\$ 3,614,784</b>

**Unfunded Actuarial Liability (UAL) and Funded Ratios**

The UAL is the difference between the actuarial liability and an asset measure. This difference represents how far ahead or behind the funding target the assets are as of the valuation date. If all assumptions are met in the future, contributions in addition to the normal cost will be needed to pay off the UAL. For determining contribution amounts, the UAL is measured using the actuarial value of assets (AVA), which dampens the impact of short-term volatility in investment returns on contribution rates. However, it is important to also understand the UAL measured using the market value of assets (MVA) as this is the amount that must ultimately be made up either through future contributions or future experience.

The funded ratio is simply the ratio of assets to actuarial liability, the funding target for COPERS. It is measured using both the AVA and the MVA. As the funded ratio compares assets to the funding target, it is appropriate for assessing the need for and amount of future contributions in excess of the normal cost. It is not appropriate for other purposes such as

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**SECTION IV – FUNDING LIABILITY MEASURES**

assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations.

Table IV-6 shows the calculation of the UAL and funded ratio based both on the actuarial and market value of assets as of June 30, 2015 and June 30, 2014.

<b>Table IV - 6</b>		
<b>Unfunded Actuarial Liability (UAL)</b>		
	<b>June 30, 2015</b>	<b>June 30, 2014</b>
Actuarial Liability (AL)	\$ 3,975,908,185	\$ 3,614,784,229
Actuarial Value of Assets (AVA)	2,202,923,270	2,120,700,320
AVA Unfunded AL (UAL)	\$ 1,772,984,915	\$ 1,494,083,909
AVA Funded Ratio (AVA/AL)	55.4%	58.7%
Market Value of Assets (MVA)	2,209,525,632	2,222,241,522
MVA UAL	\$ 1,766,382,553	\$ 1,392,542,707
MVA Funded Ratio (MVA/AL)	55.6%	61.5%

**Analysis of Change in Unfunded Actuarial Liability (UAL)**

The UAL is expected to change at each valuation for a variety of reasons. Table IV-7 on the next page develops the expected UAL measured on the actuarial value of assets and identifies the primary sources for changes in this UAL since the last valuation.

CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015

**SECTION IV – FUNDING LIABILITY MEASURES**

Table IV - 7	
Development Of Experience (Gain) / Loss	
Item	Amount
1. AVA Unfunded Actuarial Liability at June 30, 2014	\$ 1,494,083,909
2. Normal Cost for Year	75,310,248
3. Expected City and Member Contributions	157,314,457
4. Interest	109,036,729
5. Assumption Changes	254,870,179
6. Expected AVA Unfunded Actuarial Liability at June 30, 2015 [1. + 2. - 3. + 4. + 5.]	\$ 1,775,986,607
7. Actual AVA Unfunded Actuarial Liability at June 30, 2015	\$ 1,772,984,915
8. (Gain) or Loss [7. - 6.]	\$ (3,001,692)
Difference portion due to:	
Asset Experience	28,007,301
Salary Increases	(56,652,595)
Retirement	21,784,623
Mortality	8,310,457
Termination	6,436,425
COLA	(5,732,230)
Other Experience	<u>(5,155,673)</u>
Total	\$ (3,001,692)

## SECTION V – CONTRIBUTIONS

Under the funding method employed by COPERS, there are three components to the Projected Percentage, which is the total contribution rate defined by the City Charter: the normal cost rate, the administrative expense rate, and the amortization payment on the unfunded actuarial liability (UAL) expressed as a percentage of total annual compensation. The normal cost rates for each tier were developed in Section IV. Additionally, as stated in Section IV, the administrative expense rate is 0.07% for all tiers. This section develops the UAL amortization payment rate and the Projected Percentage. Then, the Projected Percentage is split between members and the City as required by the City Charter, and finally, the total City contribution is estimated.

The UAL is composed of experience gains and losses, assumption changes, and plan provision changes. In September 2013, the Board adopted amortization methods that:

1. Amortize the UAL measured before the assumption changes as of July 1, 2013 over a closed 25-year period as a level percentage of payroll,
2. Amortize the change in UAL due to the assumption changes as of July 1, 2013 over a closed 25-year period as a level percentage of payroll with a four-year phase-in to the ultimate rate, and
3. Amortize future gains and losses over closed 20-year periods from the date in which they are first recognized as a level percent of payroll (except future gains cannot be amortized over a period shorter than the period remaining on the 25-year amortizations described above).

Table V-1 shows the amortization payment for each of the five current components of the total UAL rate, consisting of separate components for the UAL as of June 30, 2013 before assumption changes, the gains and losses for each year since 2013, and the assumption changes in 2013 and 2015. There are 23 years remaining on the amortization period for all current components, except the 2015 assumption changes that has 20 years remaining on its amortization. All current components are amortized as a level percentage of payroll assuming 3.5% increases in total annual compensation each year. However, the amortization of the September 2013 assumption change is in the third year of a four-year phase-in to the full amortization rate, so the payment on the amortization of these changes is currently three-quarters of what it would be without the phase-in. Additionally, the amortization of the June 30, 2015 assumption changes is in the first year of a four-year phase-in to the full amortization rate, so the payment on the amortization of these assumption changes is one-quarter of what it would be without the phase-in.

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**SECTION V – CONTRIBUTIONS**

<b>Table V - 1</b>				
<b>Development Of UAL Contribution Rate</b>				
<b>Amortization Base</b>	<b>Outstanding Balance</b>	<b>Remaining Period</b>	<b>Amortization Payment</b>	<b>Amortization % of Pay</b>
2013 UAL	\$ 1,113,161,229	23	\$ 73,795,835	15.22%
2013 Assumption Changes <sup>1</sup>	466,687,608	23	23,203,918	4.79%
2014 Experience Gain	(58,732,410)	23	(3,893,602)	-0.80%
2015 Experience Gain	(3,001,691)	23	(198,994)	-0.04%
2015 Assumption Changes <sup>2</sup>	<u>254,870,179</u>	20	<u>4,624,323</u>	<u>0.95%</u>
<b>Total</b>	<b>\$ 1,772,984,915</b>		<b>\$ 97,531,480</b>	<b>20.12%</b>

<sup>1</sup> The amortization of the 2013 assumption changes is phased-in over four years. The first year payment is one-fourth of the regularly calculated amortization payment, increasing each year until the regularly calculated amortization payment is made after four years.

<sup>2</sup> The amortization of the 2015 assumption changes is phased-in over four years. The first year payment is one-fourth of the regularly calculated amortization payment, increasing each year until the regularly calculated amortization payment is made after four years.

The Projected Percentage consists of the normal cost rate, the administrative expense rate, and the UAL rate. For Tier 1, members contribute 5 percent of pay and the City contributes the balance of the Projected Percentage. For Tier 2, the members and City each contribute half of the Projected Percentage until January 1, 2016. After January 1, 2016, for Tier 2 and Tier 3, members contribute one-half of the Projected Percentage, up to a maximum of 11 percent of pay and the City contributes the balance of the Projected Percentage. These contribution rates are applied to the actual payroll for each Tier for the applicable fiscal year in developing the City's total contribution. Table V-2 on the following page summarizes the contribution rates and estimated contribution amounts for the fiscal years ending June 30, 2017 and June 30, 2016.

CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015

**SECTION V – CONTRIBUTIONS**

<b>Table V - 2</b>		
<b>Summary Of Contribution Rates And Estimated Amounts</b>		
<b>Fiscal Year Ending</b>	<b>June 30, 2017</b>	<b>June 30, 2016</b>
Total Normal Cost Rate	16.40%	14.84%
Administrative Expense Rate	0.07%	0.07%
Total UAL Contribution Rate	<u>20.12%</u>	<u>16.10%</u>
Projected Percentage	36.59%	31.01%
<b>Member Contribution Rates</b>		
Tier 1	5.00%	5.00%
Tier 2	11.00%	15.51% <sup>1</sup>
Tier 3	11.00%	11.00%
<b>City Contribution Rates</b>		
Tier 1	31.59%	26.01%
Tier 2	25.59%	15.51% <sup>1</sup>
Tier 3	25.59%	20.01%
<b>Projected Payroll</b>		
Tier 1	\$ 419,248,797	\$ 449,317,515
Tier 2	50,131,375	77,774,102
Tier 3	<u>32,442,795</u>	<u>0</u>
Total	\$ 501,822,967	\$ 527,091,617
<b>Estimated Contribution Amounts</b>		
Members	\$ 30,045,599	\$ 34,528,639
City	<u>153,571,425</u>	<u>128,922,471</u>
Total	\$ 183,617,024	\$ 163,451,110

<sup>1</sup> Rate in effect beginning July 1, 2015. Effective January 1, 2016, the Tier 2 member rate is capped at 11%, and the City rate is increased to 20.01%.

## SECTION VI – ACCOUNTING AND FINANCIAL REPORTING UNDER GASB 67 AND 68

This section provides accounting and financial disclosure information under Governmental Accounting Standards Board (GASB) Statement No. 67 for COPERS as well as GASB No. 68 information for the City of Phoenix (City). This information includes:

- Determination of the single rate of return used as the discount rate for measuring the Total Pension Liability (TPL)
- Changes in the TPL, Fiduciary Net Position (FNP), and Net Pension Liability (NPL)
- Calculation of the NPL at the discount rate as well as discount rates one percent higher and one percent lower
- Schedule of changes in NPL and related ratios
- Schedule of employer contributions
- Schedule of deferred inflows and outflows of resources
- Calculation of pension expense

The measurement date for this report is June 30, 2015. This measurement date is used for the System's GASB 67 reporting and the City's GASB 68 reporting as of the June 30, 2015 reporting. Measurements are based on the fair value of assets as of June 30, 2015 and the Total Pension Liability as of the valuation date, also June 30, 2015.

The beginning-of-year measurements for FYE 2015 are based on the actuarial valuation as of June 30, 2014. The end-of-year measurements for FYE 2015 are based on the actuarial valuation as of June 30, 2015. The assumption changes adopted for the June 30, 2015 actuarial valuation are reflected in the end of year measurements.

### **Determination of Discount Rate**

The discount rate used to measure the Total Pension Liability as of both June 30, 2014 and June 30, 2015 was 7.50%, equal to the assumed long-term expected rate of return on the System's investments.

We have assumed that employee and City contributions to COPERS will continue to follow the established contribution policy. The total contribution rate is the sum of the normal cost rate, the administrative expense rate, and the unfunded actuarial liability (UAL) rate. The normal cost rate is determined under the entry age actuarial cost method. The administrative expense rate is assumed to be 0.07% of annual compensation. The UAL rate is the sum of the amortization rates for each amortization base. As of June 30, 2015, there are five amortization bases, the June 30, 2013 UAL before assumption changes, the experience gains for the plan years 2014 and 2015, and the assumption changes in 2013 and 2015. There are 23 years remaining on the amortization period for all current components except the 2015 assumption changes that has 20 years remaining on its amortization. All current components are being amortized as a level percentage of annual compensation assuming 3.5% increases in total annual compensation each year. The amortization of both the 2013 and 2015 assumption changes is being phased-in over four years to the full amortization rate, with the current payment on the amortization of the 2013 assumption changes being three-quarters of what it would be without the phase-in and the current payment of the 2015 assumption changes being one-quarter of what it would be without the phase-in.

CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015

**SECTION VI – ACCOUNTING AND FINANCIAL REPORTING UNDER GASB 67 AND 68**

We have not performed a formal cash flow projection as described under Paragraph 41 of GASB Statement 67. However, Paragraph 43 allows for alternative methods to confirm the sufficiency of the FNP if the evaluations “can be made with sufficient reliability without a separate projection of cash flows into and out of the pension plan...” In our professional judgment, adherence to the contribution policy described above will result in the System’s projected FNP being greater than or equal to the benefit payments projected for each future period.

Therefore, the long-term expected rate of return on System investments was applied as the single rate to all periods of projected benefit payments to determine the TPL. Additionally, the actuarial methods and assumptions used in developing the TPL, including the use of the entry age actuarial cost method as described in paragraph 46 of GASB 67, are the same as those used in developing the actuarial liability for funding purposes. As a result, the TPL is identical to the actuarial liability calculated for funding purposes and shown in Section IV of this report.

**Note Disclosures**

The table below shows the changes in the Total Pension Liability, the Plan Fiduciary Net Position (i.e., fair value of System assets), and the Net Pension Liability during the measurement year.

<b>Table VI - 1</b>			
<b>Change in Net Pension Liability</b>			
	Increase (Decrease)		
	Total Pension Liability (a)	Plan Fiduciary Net Position (b)	Net Pension Liability (a) - (b)
<b>Balances at 6/30/2014</b>	\$ 3,614,784	\$ 2,222,242	\$ 1,392,543
<b>Changes for the year:</b>			
Service cost	75,310		75,310
Interest	266,355		266,355
Changes of benefits	0		0
Differences between expected and actual experience	(31,009)		(31,009)
Changes of assumptions	254,870		254,870
Contributions - employer		117,092	(117,092)
Contributions - member		27,861	(27,861)
Net investment income		47,148	(47,148)
Benefit payments	(204,403)	(204,403)	0
Administrative expense		(414)	414
<b>Net changes</b>	<u>361,124</u>	<u>(12,716)</u>	<u>373,840</u>
<b>Balances at 6/30/2015</b>	<u>\$ 3,975,908</u>	<u>\$ 2,209,526</u>	<u>\$ 1,766,383</u>

*Amounts in Thousands*

**SECTION VI – ACCOUNTING AND FINANCIAL REPORTING UNDER GASB 67 AND 68**

There were no changes in benefits, but changes in assumptions increased the TPL by \$255 million during the year. The difference between expected and actual experience was a gain of approximately \$31 million. The sources of this gain are shown in Table IV-7 (excluding asset experience).

Total contributions and investment income trailed the service cost, interest cost, and administrative expenses, resulting in an increase in the Net Pension Liability (NPL) of approximately \$150.0 million. When combined with the assumption change increase and plan experience decrease the NPL increased by approximately \$374 million. The NPL remaining as of June 30, 2015 is approximately \$1.8 billion.

Changes in the discount rate affect the measurement of the TPL. Lower discount rates produce a higher TPL and higher discount rates produce a lower TPL. Because the discount rate does not affect the measurement of assets, the percentage change in the NPL can be very significant for a relatively small change in the discount rate. The table below shows the sensitivity of the NPL to the discount rate.

Table VI - 2			
Sensitivity of Net Pension Liability to Changes in Discount Rate			
	1% Decrease 6.50%	Discount Rate 7.50%	1% Increase 8.50%
Total Pension Liability	\$ 4,474,002	\$ 3,975,908	\$ 3,561,466
Plan Fiduciary Net Position	2,209,526	2,209,526	2,209,526
Net Pension Liability	<u>\$ 2,264,476</u>	<u>\$ 1,766,383</u>	<u>\$ 1,351,940</u>
Plan Fiduciary Net Position as a Percentage of the Total Pension Liability	49.4%	55.6%	62.0%

*Amounts in Thousands*

A one percent decrease in the discount rate increases the TPL by approximately 13% and increases the NPL by approximately 28%. A one percent increase in the discount rate decreases the TPL by approximately 10% and decreases the NPL by approximately 23%.

**Required Supplementary Information**

The schedules of Required Supplementary Information generally start with one year of information as of the implementation of GASB 67, but eventually will need to build up to 10 years of information. The schedule on the next page shows the changes in NPL and related ratios required by GASB. We are providing only the current year, which should be combined with available prior years.

CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015

**SECTION VI – ACCOUNTING AND FINANCIAL REPORTING UNDER GASB 67 AND 68**

<b>Table VI - 3</b>		
<b>Schedule of Changes in Net Pension Liability and Related Ratios</b>		
	<b>FYE 2015</b>	<b>FYE 2014</b>
<b><u>Total Pension Liability</u></b>		
Service cost (MOY)	\$ 75,310	\$ 78,331
Interest (includes interest on service cost)	266,355	257,219
Changes of benefit terms	0	0
Differences between expected and actual experience	(31,009)	(20,336)
Changes of assumptions	254,870	0
Benefit payments, including refunds of member contributions	(204,403)	(179,877)
<b>Net change in total pension liability</b>	<b>\$ 361,124</b>	<b>\$ 135,337</b>
<b>Total pension liability - beginning</b>	<b>3,614,784</b>	<b>3,479,447</b>
<b>Total pension liability - ending</b>	<b>\$ 3,975,908</b>	<b>\$ 3,614,784</b>
<b><u>Plan fiduciary net position</u></b>		
Contributions - employer	\$ 117,092	\$ 110,629
Contributions - member	27,861	27,760
Net investment income	47,148	298,736
Benefit payments, including refunds of member contributions	(204,403)	(179,877)
Administrative expense	(414)	(628)
<b>Net change in plan fiduciary net position</b>	<b>\$ (12,716)</b>	<b>\$ 256,620</b>
<b>Plan fiduciary net position - beginning</b>	<b>2,222,242</b>	<b>1,965,622</b>
<b>Plan fiduciary net position - ending</b>	<b>\$ 2,209,526</b>	<b>\$ 2,222,242</b>
<b>Net pension liability - ending</b>	<b>\$ 1,766,383</b>	<b>\$ 1,392,543</b>
<b>Plan fiduciary net position as a percentage of the total pension liability</b>	<b>55.57%</b>	<b>61.48%</b>
<b>Covered employee payroll</b>	<b>\$ 460,441</b>	<b>\$ 485,227</b>
<b>Net pension liability as a percentage of covered employee payroll</b>	<b>383.63%</b>	<b>286.99%</b>

*Amounts in Thousands*

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**SECTION VI – ACCOUNTING AND FINANCIAL REPORTING UNDER GASB 67 AND 68**

Since an Actuarially Determined Contribution (ADC) is calculated, a 10-year schedule is required showing the following:

1. The Actuarially Determined Contribution (formerly referred to as the ARC),
2. Actual contributions related to the ADC,
3. The difference between the ADC and actual contributions related to the ADC,
4. The covered employee payroll, and
5. The actual contributions as a percentage of covered employee payroll.

Because prior contribution amounts were determined in accordance with Actuarial Standards of Practice, we believe the full 10-year schedule should be shown.

<b>Table VI - 4 Schedule of Employer Contributions</b>										
	FYE 2015	FYE 2014	FYE 2013	FYE 2012	FYE 2011	FYE 2010	FYE 2009	FYE 2008	FYE 2007	FYE 2006
Actuarially Determined Contribution	\$ 117,092	\$ 135,441	\$ 126,816	\$ 125,454	\$ 110,094	\$ 106,483	\$ 92,145	\$ 86,591	\$ 67,153	\$ 64,198
Contributions in Relation to the Actuarially Determined Contribution	<u>117,092</u>	<u>110,629</u>	<u>115,244</u>	<u>114,709</u>	<u>105,682</u>	<u>90,965</u>	<u>86,241</u>	<u>66,383</u>	<u>64,198</u>	<u>58,151</u>
Contribution Deficiency/(Excess)	<u>\$ 0</u>	<u>\$ 24,812</u>	<u>\$ 11,571</u>	<u>\$ 10,745</u>	<u>\$ 4,412</u>	<u>\$ 15,518</u>	<u>\$ 5,904</u>	<u>\$ 20,209</u>	<u>\$ 2,955</u>	<u>\$ 6,047</u>
Covered-Employee Payroll	\$ 460,441	\$ 485,227	\$ 508,948	\$ 506,422	\$ 516,467	\$ 556,088	\$ 564,650	\$ 586,778	\$ 530,013	\$ 490,043
Contributions as a Percentage of Covered-Employee Payroll	25.43%	22.80%	22.64%	22.65%	20.46%	16.36%	15.27%	11.31%	12.11%	11.87%

*Amounts in Thousands*

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**SECTION VI – ACCOUNTING AND FINANCIAL REPORTING UNDER GASB 67 AND 68**

The following information on key methods and assumptions used to calculate the ADC for FYE 2015 should be presented as notes to the schedule:

Notes to Schedule	
Valuation date:	June 30, 2013
Timing	Actuarially determined contribution rates are calculated based on the actuarial valuation one year prior to the beginning of the plan year
Actuarial cost method	Entry age
Asset valuation method	4-year smoothed market
Amortization method	The entire UAL is amortized as a level percentage of payroll over an open 20-year period.
Discount rate	7.50%
Salary increases	3.50% plus merit component based on age ranging from 3.80% at age 20 to 0.00% for members age 65 and older
Amortization payment growth rate	3.50%
COLA	1.50%
Mortality	Male and female RP-2000 combined employee and annuitant tables.
A complete description of the methods and assumptions used to determine contribution rates for the fiscal year ending June 30, 2015 can be found in the June 30, 2013 actuarial valuation report.	

**SECTION VI – ACCOUNTING AND FINANCIAL REPORTING UNDER GASB 67 AND 68**

**Employer Reporting Amounts**

It is our understanding that the City of Phoenix has elected to use measurement dates the same as each reporting date in implementing GASB 68. As a result, the schedules in this section will be used by the City of Phoenix for its 2015 reporting.

The impact of experience gains or losses and assumption changes on the TPL are recognized in expense over the average expected remaining service life of all active and inactive members of the System. As of the measurement date, this recognition period was 5.0 years.

During the measurement year, there was an experience gain of approximately \$31.0 million. Approximately \$6.2 million of that gain is recognized in the current year and an identical amount will be recognized in each of the next four years, resulting in a deferred inflow of resources of approximately \$24.8 million.

The impact of investment gains or losses is recognized over a period of five years for all plans. During the measurement year, there was an investment loss of approximately \$117.3 million. Approximately \$23.5 million of that gain is recognized in the current year and an identical amount will be recognized in each of the next four years, resulting in a deferred outflow of resources of approximately \$93.8 million.

During the measurement year, there were assumption changes of approximately \$254.9 million. Approximately \$51.0 million of this was recognized in the current year and an identical amount will be recognized in each of the next four years, resulting in a deferred outflow of resources of approximately \$203.9 million.

The table on the following page summarizes the current balances of deferred outflows and deferred inflows of resources along with the net recognition over the next five years.

SECTION VI – ACCOUNTING AND FINANCIAL REPORTING UNDER GASB 67 AND 68

<b>Table VI - 5</b>														
<b>Schedule of Deferred Inflows and Outflows of Resources</b>														
	<b>Deferred Outflows of Resources</b>	<b>Deferred Inflows of Resources</b>												
Differences between expected and actual experience	\$ 0	\$ 24,807												
Changes in assumptions	203,896	0												
Net difference between projected and actual earnings on pension plan investments	93,852	0												
<b>Total</b>	<b><u>\$ 297,749</u></b>	<b><u>\$ 24,807</u></b>												
<p>Amounts reported as deferred outflows and deferred inflows of resources will be recognized in pension expense as follows:</p> <p style="text-align: center;"><b>Measurement year ended June 30:</b></p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding-right: 20px;">2016</td> <td style="text-align: right;">68,235</td> </tr> <tr> <td>2017</td> <td style="text-align: right;">68,235</td> </tr> <tr> <td>2018</td> <td style="text-align: right;">68,235</td> </tr> <tr> <td>2019</td> <td style="text-align: right;">68,235</td> </tr> <tr> <td>2020</td> <td style="text-align: right;">0</td> </tr> <tr> <td>Thereafter \$</td> <td style="text-align: right;">0</td> </tr> </table>			2016	68,235	2017	68,235	2018	68,235	2019	68,235	2020	0	Thereafter \$	0
2016	68,235													
2017	68,235													
2018	68,235													
2019	68,235													
2020	0													
Thereafter \$	0													

*Amounts in Thousands*

The annual pension expense recognized by the City can be calculated two different ways. First, it is the change in the amounts reported on the City's Statement of Net Position that relate to the System and are not attributable to employer contributions. That is, it is the change in NPL plus the changes in deferred outflows and inflows plus employer contributions.

Alternatively, annual pension expense can be calculated by its individual components. While GASB does not require or suggest the organization of the individual components shown in the table on the next page, we believe it helps to understand the level and volatility of pension expense.

CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015

**SECTION VI – ACCOUNTING AND FINANCIAL REPORTING UNDER GASB 67 AND 68**

<b>Table VI - 6</b>	
<b>Calculation of Pension Expense</b>	
	<b>Measurement Year Ending 2015</b>
Change in Net Pension Liability	\$ 373,840
Change in Deferred Outflows	(297,749)
Change in Deferred Inflows	24,807
Employer Contributions	<u>117,092</u>
<b>Pension Expense</b>	<b>\$ 217,991</b>
<b>Pension Expense as % of Payroll</b>	<b>47.34%</b>
<b>Operating Expenses</b>	
Service cost	\$ 75,310
Employee contributions	(27,861)
Administrative expenses	<u>414</u>
Total	\$ 47,864
<b>Financing Expenses</b>	
Interest cost	\$ 266,355
Expected return on assets	<u>(164,464)</u>
Total	\$ 101,892
<b>Changes</b>	
Benefit changes	\$ 0
Recognition of assumption changes	50,974
Recognition of liability gains and losses	(6,202)
Recognition of investment gains and losses	<u>23,463</u>
Total	\$ 68,235
<b>Pension Expense</b>	<b>\$ 217,991</b>

First, there are components referred to as operating expenses. These are items directly attributable to the operation of the plan during the measurement year. Service cost less employee contributions represents the increase in employer-provided benefits attributable to the year, and administrative expenses are the cost of operating the System for the year.

Second, there are the financing expenses: the interest on the Total Pension Liability less the expected return on assets. Since the discount rate is equal to the long-term expected return on assets, the financing expense is just the interest on the Net Pension Liability with an adjustment for the difference between the interest on the service cost and contributions.

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**SECTION VI – ACCOUNTING AND FINANCIAL REPORTING UNDER GASB 67 AND 68**

The final category is changes. This category will drive most of the volatility in pension expense from year to year. It includes any changes in benefits made during the year and recognized amounts due to assumption changes, gains or losses on the TPL, and investment gains or losses. For the current year, the recognition of the assumption changes significantly increases the pension expense.

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**SECTION VII – ACTUARIAL SECTION OF THE CAFR**

The Government Finance Officers Association (GFOA) maintains a checklist of items to be included in the System's Comprehensive Annual Financial Report (CAFR) in order to receive recognition for excellence in financial reporting. The schedules in this section are listed by the GFOA for inclusion in the Actuarial Section of the System's CAFR.

Since the financial reporting for 2013 was based on results prior to the assumption changes adopted by the Board in September, the effect of those assumption changes is shown in FYE 2014.

<b>Table VII - 1</b>						
<b>Schedule Of Funding Progress</b>						
<b>Valuation Date</b> <b>June 30,</b>	<b>(1)</b> <b>Actuarial Value of Assets</b>	<b>(2)</b> <b>Actuarial Liability (AL)</b>	<b>(3)</b> <b>Percent Funded (1) / (2)</b>	<b>(4)</b> <b>Unfunded AL (UAL) (2) - (1)</b>	<b>(5)</b> <b>Annual Covered Payroll</b>	<b>(6)</b> <b>UAL as a % of Covered Payroll (4) / (5)</b>
2015	\$ 2,202,923	\$ 3,975,908	55.4%	\$ 1,772,985	\$ 484,853	365.7%
2014	2,120,700	3,614,784	58.7%	1,494,084	509,267	293.4%
2013	1,961,939	3,055,606	64.2%	1,093,668	508,032	215.3%
2012	1,827,528	2,939,374	62.2%	1,111,845	506,017	219.7%
2011	1,834,620	2,752,909	66.7%	918,289	513,322	178.9%
2010	1,868,093	2,697,288	69.3%	829,195	550,175	150.7%
2009	1,895,148	2,518,094	75.3%	622,946	539,468	115.5%
2008	1,908,414	2,413,365	79.1%	504,951	566,512	89.1%
2007	1,816,508	2,166,119	83.9%	349,611	535,079	65.3%
2006	1,626,741	2,000,346	81.3%	373,605	497,105	75.2%

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**SECTION VII – ACTUARIAL SECTION OF THE CAFR**

<b>Table VII - 2 Solvency Test</b>							
<b>Valuation Date</b>	<b>Aggregate Accrued Liabilities for</b>			<b>Valuation Assets</b>	<b>Portion of Accrued Liabilities Covered by Assets</b>		
	<b>(1) Active Member Contributions</b>	<b>(2) Retirees and Beneficiaries</b>	<b>(3) Active Members Employer Portion</b>		<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
	6/30/2015	\$383,029	\$2,465,862		\$1,127,017	\$2,202,923	100%
6/30/2014	393,754	2,099,274	1,121,756	2,120,700	100	82	0
6/30/2013	396,583	1,881,123	1,201,741	1,962,533	100	83	0
6/30/2012	443,964	1,525,152	970,258	1,827,528	100	91	0
6/30/2011	446,456	1,431,877	874,576	1,834,620	100	97	0
6/30/2010	445,141	1,311,929	940,217	1,868,093	100	100	12
6/30/2009	446,039	1,193,391	878,664	1,895,148	100	100	29
6/30/2008	433,742	1,066,886	912,737	1,908,414	100	100	45
6/30/2007	403,819	964,006	798,294	1,816,509	100	100	56
6/30/2006	374,091	892,123	734,131	1,626,741	100	100	49

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**SECTION VII – ACTUARIAL SECTION OF THE CAFR**

<b>Table VII - 3 Analysis Of Financial Experience</b>										
	<b>2015</b>	<b>2014</b>	<b>2013</b>	<b>2012</b>	<b>2011</b>	<b>2010</b>	<b>2009</b>	<b>2008</b>	<b>2007</b>	<b>2006</b>
1. UAAL at Start of Year	\$ 1,494,084	\$ 1,516,915	\$ 1,111,845	\$ 918,289	\$ 829,195	\$ 622,946	\$ 504,950	\$ 349,611	\$ 373,605	\$ 283,961
2. Normal Cost for year	75,679	78,331	71,828	77,366	80,099	78,731	83,089	72,806	66,246	64,510
3. Contributions	(157,683)	(153,885)	(143,502)	(133,822)	(119,613)	(116,482)	(98,157)	(95,435)	(88,358)	(80,953)
4. Assumed Investment Income Accrual on (1), (2) and (3)	109,037	110,987	86,136	71,248	64,652	48,228	39,755	27,005	29,004	22,059
5. Expected UAAL Before Changes	\$ 1,521,117	\$ 1,552,347	\$ 1,126,307	\$ 933,081	\$ 854,333	\$ 633,424	\$ 529,637	\$ 353,987	\$ 380,496	\$ 289,577
6. Effect of Assumption/Method Changes	254,870	0	423,247	0	0	0	0	74,539	0	49,051
7. Effect of Benefit Changes	0	0	0	0	0	0	0	0	0	0
8. Expected UAAL After Changes	\$ 1,775,987	\$ 1,552,347	\$ 1,549,554	\$ 933,081	\$ 854,333	\$ 633,424	\$ 529,637	\$ 428,526	\$ 380,496	\$ 338,629
9. Actual UAAL	1,772,985	1,494,084	1,516,915	1,111,845	918,289	829,195	622,946	504,950	349,611	373,605
10. Gain / (Loss) [8. - 9.]	\$ 3,002	\$ 58,263	\$ 32,639	\$ (178,764)	\$ (63,956)	\$ (195,771)	\$ (93,309)	\$ (76,424)	\$ 30,885	\$ (34,976)
11. As % of AAL at Start of Year	0.1%	1.7%	1.1%	(6.5)%	(2.4)%	(7.8)%	(3.9)%	(3.5)%	1.5%	(1.9)%

*Dollar amounts in thousands*

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**APPENDIX A – MEMBERSHIP INFORMATION**

<b>Table A - 1</b>							
<b>Active Member Data</b>							
	<b>June 30, 2015</b>			<b>June 30, 2014</b>			<b>% Change</b>
	<b>Tier 1</b>	<b>Tier 2</b>	<b>Total</b>	<b>Total</b>	<b>Total</b>		
<b>Total</b>							
Count	6,741	722	7,463	7,421	310	7,731	-3.5%
Average Current Age	47.6	38.6	46.7	47.2	38.4	46.8	-0.2%
Average Vesting Service	13.8	1.0	12.6	13.3	0.6	12.8	-1.6%
Prior Year Actual Annualized Pensionable Earnings							
Total	\$448,686,312	\$ 36,166,796	\$484,853,108	\$493,562,875	\$ 15,704,388	\$509,267,263	-4.8%
Average	\$ 66,561	\$ 50,093	\$ 64,968	\$ 66,509	\$ 50,660	\$ 65,874	-1.4%

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**APPENDIX A – MEMBERSHIP INFORMATION**

<b>Table A - 2</b>						
<b>Non-Active Member Data</b>						
	<b>Count</b>			<b>Average Age</b>		
	<b>June 30, 2015</b>	<b>June 30, 2014</b>	<b>% Change</b>	<b>June 30, 2015</b>	<b>June 30, 2014</b>	<b>% Change</b>
<b><u>Total</u></b>						
Retirees	5,419	5,080	6.7%	68.3	68.4	-0.1%
Disableds	251	249	0.8%	63.3	63.1	0.3%
Beneficiaries & QDROs	<u>1,018</u>	<u>961</u>	5.9%	<u>71.6</u>	<u>72.3</u>	-1.1%
Payee Total	6,688	6,290	6.3%	68.6	68.8	-0.3%
Deferred Vesteds	901	816	10.4%	48.3	48.7	-0.8%

<b>Table A - 3</b>						
<b>Non-Active Member Data</b>						
	<b>Total Annual Benefit*</b>			<b>Average Annual Benefit*</b>		
	<b>June 30, 2015</b>	<b>June 30, 2014</b>	<b>% Change</b>	<b>June 30, 2015</b>	<b>June 30, 2014</b>	<b>% Change</b>
<b><u>Total</u></b>						
Retirees	\$ 185,103,085	\$ 168,443,463	9.9%	\$ 34,158	\$ 33,158	3.0%
Disableds	3,873,354	3,639,564	6.4%	15,432	14,617	5.6%
Beneficiaries & QDROs	<u>18,896,049</u>	<u>17,301,146</u>	9.2%	<u>18,562</u>	<u>18,003</u>	3.1%
Payee Total	\$ 207,872,488	\$ 189,384,173	9.8%	\$ 31,081	\$ 30,109	3.2%
Deferred Vesteds	\$ 11,207,455	\$ 9,956,781	12.6%	\$ 12,439	\$ 12,202	1.9%

\* Benefits provided in June 30 valuation data

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**APPENDIX A – MEMBERSHIP INFORMATION**

<b>Table A - 4</b>											
<b>Distribution Of Active Tier 1 Members</b>											
<b>By Age and Service as of June 30, 2015</b>											
<b>Age</b>	<b>Counts By Age/Service</b>										<b>Total</b>
	<b>Years of Vesting Service</b>										
	<b>Under 1</b>	<b>1 to 4</b>	<b>5 to 9</b>	<b>10 to 14</b>	<b>15 to 19</b>	<b>20 to 24</b>	<b>25 to 29</b>	<b>30 to 34</b>	<b>35 to 39</b>	<b>40 &amp; up</b>	
Under 25	1	15	0	0	0	0	0	0	0	0	16
25 to 29	7	73	131	11	0	0	0	0	0	0	222
30 to 34	6	92	276	133	8	0	0	0	0	0	515
35 to 39	12	88	263	283	140	3	0	0	0	0	789
41 to 44	10	85	266	325	302	86	9	0	0	0	1,083
45 to 49	13	76	226	281	284	193	131	17	0	0	1,221
50 to 54	8	61	207	265	287	236	220	45	2	0	1,331
55 to 59	1	50	149	217	218	167	94	56	9	0	961
60 to 64	0	17	79	116	109	62	64	16	10	0	473
65 to 69	1	8	22	23	26	13	8	7	2	0	110
70 & up	0	1	4	7	4	1	3	0	0	0	20
<b>Total</b>	<b>59</b>	<b>566</b>	<b>1,623</b>	<b>1,661</b>	<b>1,378</b>	<b>761</b>	<b>529</b>	<b>141</b>	<b>23</b>	<b>0</b>	<b>6,741</b>

<b>Table A - 5</b>											
<b>Distribution Of Average Expected Salary<sup>1</sup> For Active Tier 1 Members</b>											
<b>By Age And Service as of June 30, 2015</b>											
<b>Age</b>	<b>Counts By Age/Service</b>										<b>Total</b>
	<b>Years of Vesting Service</b>										
	<b>Under 1</b>	<b>1 to 4</b>	<b>5 to 9</b>	<b>10 to 14</b>	<b>15 to 19</b>	<b>20 to 24</b>	<b>25 to 29</b>	<b>30 to 34</b>	<b>35 to 39</b>	<b>40 &amp; up</b>	
Under 25	\$23,667	\$44,613	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$43,304
25 to 29	41,045	51,479	51,691	53,459	0	0	0	0	0	0	51,373
30 to 34	51,526	53,806	56,165	60,198	56,886	0	0	0	0	0	56,742
35 to 39	47,034	57,133	61,553	65,661	67,878	60,753	0	0	0	0	63,432
41 to 44	64,647	54,832	60,986	67,707	73,069	79,469	80,111	0	0	0	67,550
45 to 49	49,290	58,140	60,796	66,576	72,971	77,510	83,564	80,328	0	0	70,027
50 to 54	71,136	61,023	56,891	66,954	68,754	76,124	77,862	72,688	73,672	0	69,163
55 to 59	30,248	62,945	60,572	62,166	67,647	75,739	73,046	77,712	78,458	0	67,651
60 to 64	0	68,053	61,826	68,237	66,609	74,600	81,557	75,663	80,660	0	69,935
65 to 69	25,251	59,354	61,682	68,967	60,374	66,779	88,556	75,734	67,480	0	65,952
70 & up	0	34,759	47,398	62,478	60,208	60,007	77,382	0	0	0	59,734
<b>Total</b>	<b>\$52,481</b>	<b>\$56,573</b>	<b>\$58,938</b>	<b>\$65,660</b>	<b>\$69,883</b>	<b>\$76,403</b>	<b>\$79,063</b>	<b>\$76,093</b>	<b>\$78,045</b>	<b>\$0</b>	<b>\$66,552</b>

<sup>1</sup> The average expected salary amounts reported above are limited by the 401(a)(17) maximum compensation limit.

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**APPENDIX A – MEMBERSHIP INFORMATION**

<b>Table A - 6</b>											
<b>Distribution Of Active Tier 2 Members</b>											
<b>By Age and Service as of June 30, 2015</b>											
<b>Age</b>	<b>Counts By Age/Service</b>										<b>Total</b>
	<b>Years of Vesting Service</b>										
	<b>Under 1</b>	<b>1 to 4</b>	<b>5 to 9</b>	<b>10 to 14</b>	<b>15 to 19</b>	<b>20 to 24</b>	<b>25 to 29</b>	<b>30 to 34</b>	<b>35 to 39</b>	<b>40 &amp; up</b>	
Under 25	60	9	0	0	0	0	0	0	0	0	69
25 to 29	102	30	0	0	0	0	0	0	0	0	132
30 to 34	84	33	0	0	0	0	0	0	0	0	117
35 to 39	63	40	0	0	0	0	0	0	0	0	103
41 to 44	59	31	0	0	0	0	0	0	0	0	90
45 to 49	44	22	0	0	0	0	0	0	0	0	66
50 to 54	48	27	0	0	0	0	0	0	0	0	75
55 to 59	38	15	0	0	0	0	0	0	0	0	53
60 to 64	8	8	0	0	0	0	0	0	0	0	16
65 to 69	1	0	0	0	0	0	0	0	0	0	1
70 & up	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>507</b>	<b>215</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>722</b>

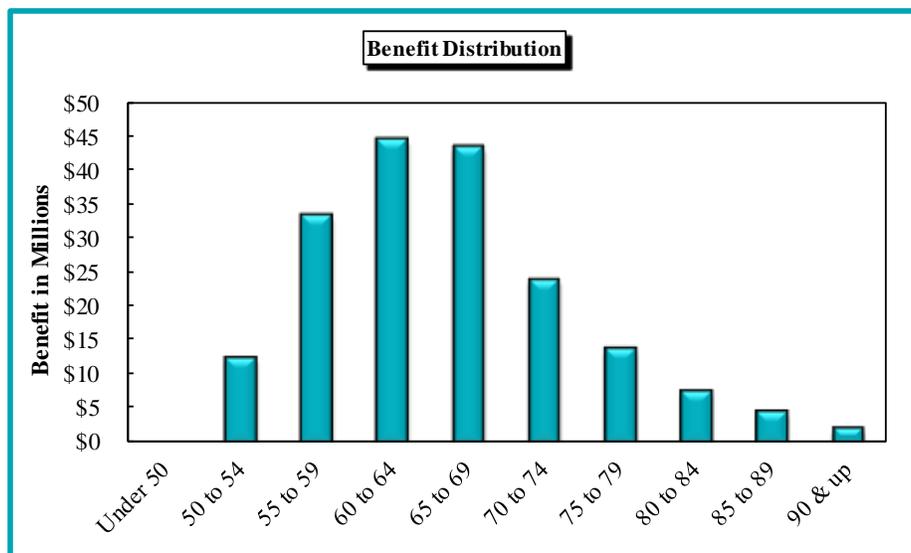
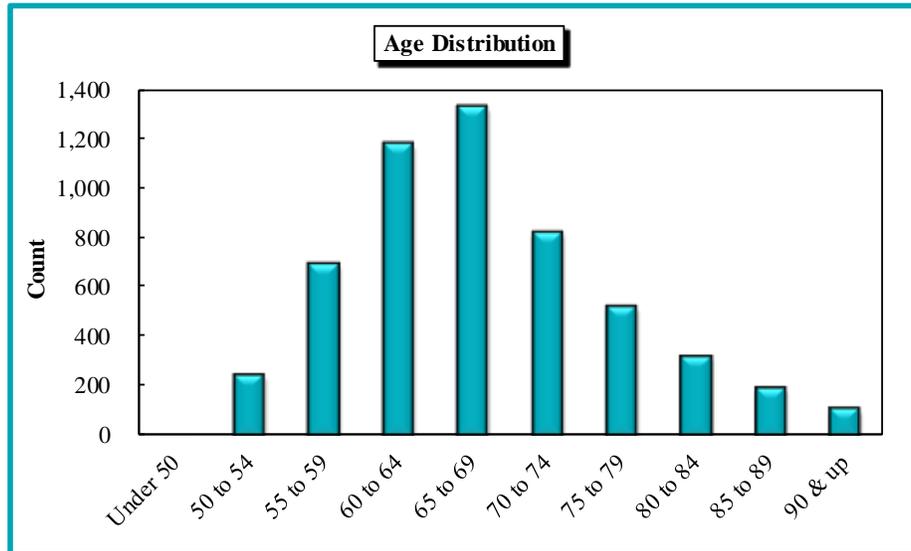
<b>Table A - 7</b>											
<b>Distribution Of Average Expected Salary<sup>1</sup> For Active Tier 2 Members</b>											
<b>By Age And Service as of June 30, 2015</b>											
<b>Age</b>	<b>Counts By Age/Service</b>										<b>Total</b>
	<b>Years of Vesting Service</b>										
	<b>Under 1</b>	<b>1 to 4</b>	<b>5 to 9</b>	<b>10 to 14</b>	<b>15 to 19</b>	<b>20 to 24</b>	<b>25 to 29</b>	<b>30 to 34</b>	<b>35 to 39</b>	<b>40 &amp; up</b>	
Under 25	\$42,488	\$40,960	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$42,289
25 to 29	44,958	47,501	0	0	0	0	0	0	0	0	45,536
30 to 34	50,227	48,429	0	0	0	0	0	0	0	0	49,720
35 to 39	51,063	47,877	0	0	0	0	0	0	0	0	49,826
41 to 44	48,625	49,585	0	0	0	0	0	0	0	0	48,956
45 to 49	51,838	53,202	0	0	0	0	0	0	0	0	52,293
50 to 54	52,281	57,179	0	0	0	0	0	0	0	0	54,044
55 to 59	57,617	82,724	0	0	0	0	0	0	0	0	64,723
60 to 64	53,882	60,108	0	0	0	0	0	0	0	0	56,995
65 to 69	35,980	0	0	0	0	0	0	0	0	0	35,980
70 & up	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>\$49,086</b>	<b>\$52,465</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$50,093</b>

<sup>1</sup> The average expected salary amounts reported above are limited by the 401(a)(17) maximum compensation limit.

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**APPENDIX A – MEMBERSHIP INFORMATION**

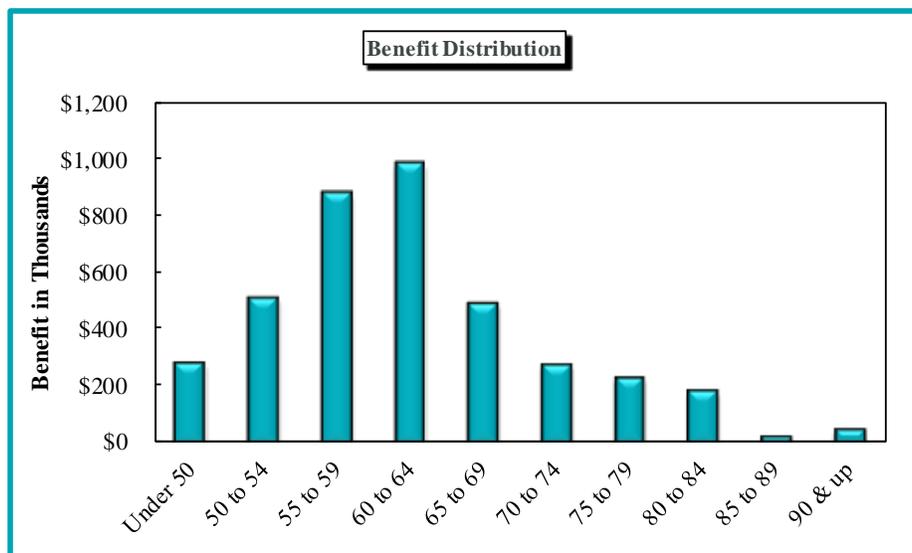
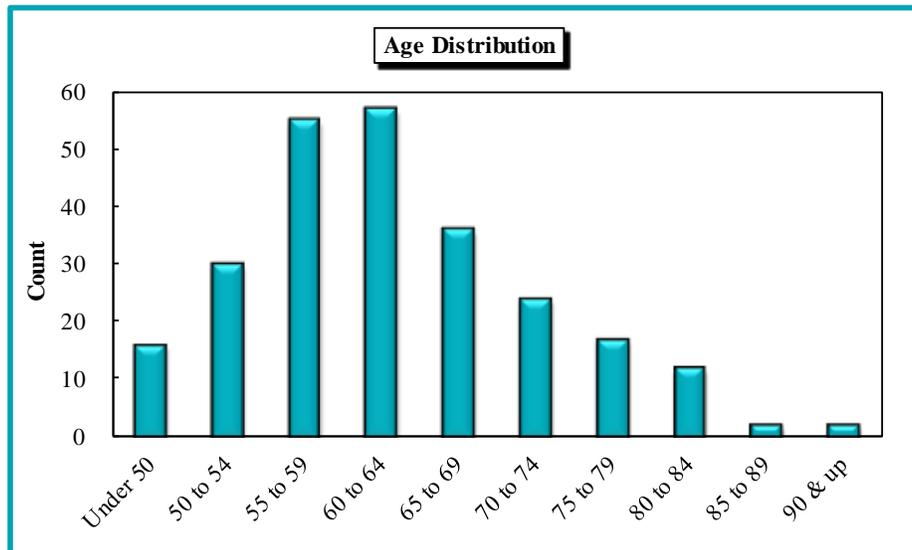
<b>Table A - 8</b>		
<b>Distribution Of Retirees as of June 30, 2015</b>		
<b>Age</b>	<b>Count</b>	<b>Annual Benefit</b>
Under 50	5	\$ 266,777
50 to 54	244	12,323,788
55 to 59	694	33,337,849
60 to 64	1,181	44,513,419
65 to 69	1,332	43,382,946
70 to 74	823	23,912,241
75 to 79	522	13,594,625
80 to 84	320	7,474,396
85 to 89	192	4,386,707
90 & up	106	1,910,337
<b>Total</b>	<b>5,419</b>	<b>\$ 185,103,085</b>



**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**APPENDIX A – MEMBERSHIP INFORMATION**

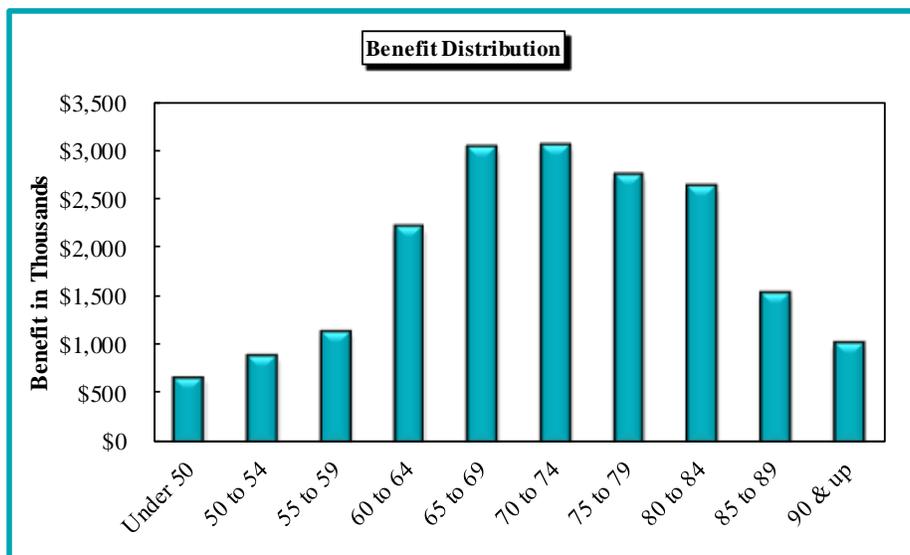
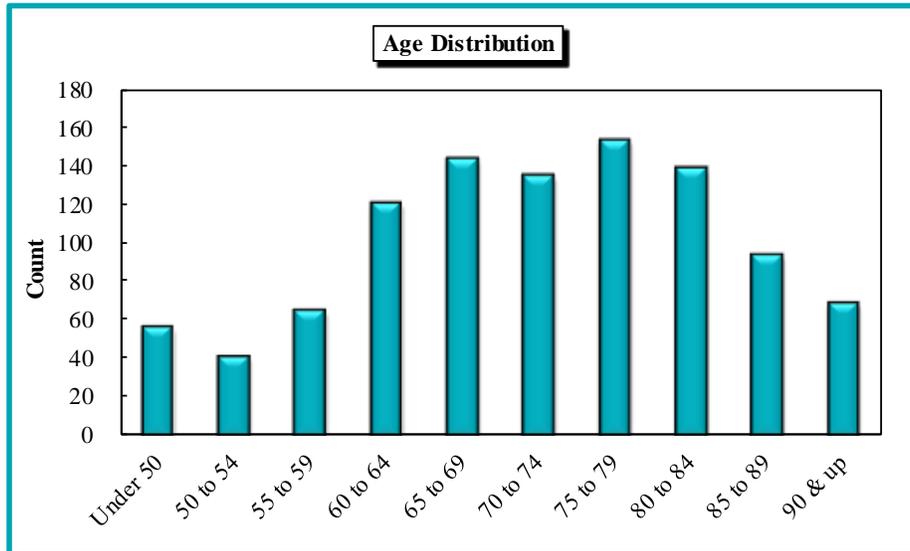
<b>Table A - 9</b>		
<b>Distribution Of Disableds as of June 30, 2015</b>		
<b>Age</b>	<b>Count</b>	<b>Annual Benefit</b>
Under 50	16	\$ 277,511
50 to 54	30	508,425
55 to 59	55	874,810
60 to 64	57	982,842
65 to 69	36	488,697
70 to 74	24	273,169
75 to 79	17	226,851
80 to 84	12	178,088
85 to 89	2	18,776
90 & up	2	44,187
<b>Total</b>	<b>251</b>	<b>\$ 3,873,354</b>



**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**APPENDIX A – MEMBERSHIP INFORMATION**

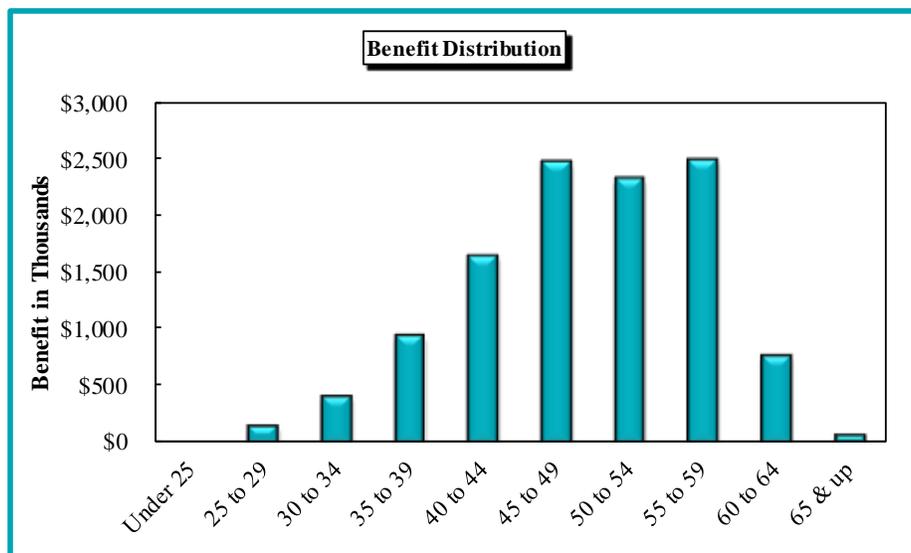
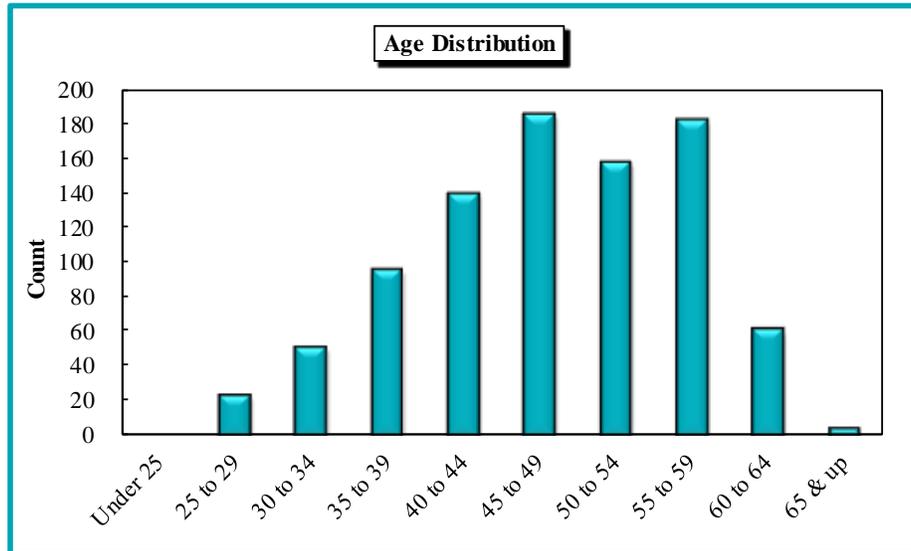
<b>Table A - 10</b>		
<b>Distribution Of Beneficiaries &amp; QDROs as of June 30, 2015</b>		
<b>Age</b>	<b>Count</b>	<b>Annual Benefit</b>
Under 50	56	\$ 660,430
50 to 54	41	879,025
55 to 59	65	1,135,147
60 to 64	121	2,210,583
65 to 69	144	3,025,445
70 to 74	135	3,056,400
75 to 79	154	2,754,149
80 to 84	139	2,627,142
85 to 89	94	1,532,221
90 & up	69	1,015,507
<b>Total</b>	<b>1,018</b>	<b>\$ 18,896,049</b>



**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**APPENDIX A – MEMBERSHIP INFORMATION**

<b>Table A - 11 Distribution Of Terminated Vesteds as of June 30, 2015</b>		
Age	Count	Annual Benefit
Under 25	0	\$ -
25 to 29	23	136,023
30 to 34	51	401,837
35 to 39	96	932,672
40 to 44	140	1,637,839
45 to 49	186	2,464,452
50 to 54	158	2,321,238
55 to 59	182	2,494,376
60 to 64	61	761,581
65 & up	4	57,437
<b>Total</b>	<b>901</b>	<b>\$ 11,207,455</b>



**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**APPENDIX A – MEMBERSHIP INFORMATION**

<b>Table A - 12</b>							
<b>Data Reconciliation</b>							
<b>from June 30, 2014 to June 30, 2015</b>							
	Actives	Terminated Vested	Retired	QDROs	Disabled	Spouses	Total
1. June 30, 2014 Valuation	<b>7,731</b>	<b>816</b>	<b>5,080</b>	<b>135</b>	<b>249</b>	<b>826</b>	<b>14,837</b>
2. Additions							
a. New Entrants	535						535
b. New Beneficiary/QDRO				14		88	102
c. Total	535			14		88	637
3. Reductions							
a. Terminated - Non-Vested	(179)						(179)
b. Cashed Out		(19)					(19)
c. Benefits Expired						(4)	(4)
d. Deaths	(24)	(6)	(138)	(2)	(10)	(39)	(219)
e. Total	(203)	(25)	(138)	(2)	(10)	(43)	(421)
4. Changes in Status							
a. Vested Terminated	(172)	172					
b. Returned to Work	13	(13)					
c. Retired	(439)	(39)	478				
d. Disabled	(2)	(10)			12		
e. Data Corrections			(1)				(1)
f. Total	(600)	110	477		12		(1)
5. June 30, 2015 Valuation	<b>7,463</b>	<b>901</b>	<b>5,419</b>	<b>147</b>	<b>251</b>	<b>871</b>	<b>15,052</b>

<b>Table A - 13</b>									
<b>Schedule Of Retirees Added to and Removed from Rolls</b>									
Year Ended	Added to Rolls			Removed		Total		Average Annual Pensions	% Increase in Pensions
	Count	New	Annual Pensions	Count	Annual Pensions	Count	Annual Pensions		
6/30/2015	578	\$20,077	\$2,406	192	\$4,225	6,541	\$205,816	\$31,466	9.7%
6/30/2014	597	20,138	1,810	145	3,232	6,155	187,559	30,473	11.1
6/30/2013	426	12,574	-	201	3,996	5,703	168,843	29,606	5.4
6/30/2012	448	14,488	-	161	4,174	5,478	160,264	29,256	6.9
6/30/2011	444	15,251	-	184	3,574	5,191	149,950	28,887	8.4
6/30/2010	432	15,139	120	170	3,206	4,931	138,273	28,042	9.5
6/30/2009	426	14,195	1,594	174	3,002	4,669	126,220	27,034	11.3
6/30/2008	348	10,935	2,874	148	2,732	4,417	113,433	25,681	10.8
6/30/2007	290	8,205	1,519	142	2,165	4,217	102,356	24,272	8.0
6/30/2006	309	9,247	1,976	147	2,144	4,069	94,797	23,297	9.0

(a) Pension Equalization Increases

Note: The dollar amounts of the pensions added to and removed from the rolls for years prior to June 30, 2011 were determined by the prior actuary. The amounts added to the rolls includes additions and deletions due to PER increases, in addition to the annual pensions for new retirees.

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**APPENDIX A – MEMBERSHIP INFORMATION**

<b>Table A - 14</b>									
<b>Schedule of Retired Members by Type of Benefit</b>									
Monthly Benefit	Number of Retirees	Type of Retirement							
		Deferred	Normal or Voluntary	Duty Disability	Non-Duty Disability	Survivor Payment	Death Benefit	Alternate Payee	
Deferred	901	901	-	-	-	-	-	-	-
\$1 - \$300	94	-	44	1	-	12	24	13	-
301 - 400	146	-	95	6	2	32	3	8	-
401 - 500	135	-	87	9	4	27	1	7	-
501 - 600	138	-	90	4	8	24	4	8	-
601 - 700	168	-	95	3	10	45	6	9	-
701 - 800	176	-	95	3	12	43	11	12	-
801 - 900	186	-	119	6	20	30	7	4	-
901 - 1,000	172	-	90	2	14	48	6	12	-
1,001 - 1,100	196	-	113	5	10	48	10	10	-
1,101 - 1,200	190	-	124	1	15	30	8	12	-
1,201 - 1,300	161	-	111	1	14	21	6	8	-
1,301 - 1,400	176	-	113	-	13	34	7	9	-
1,401 - 1,500	173	-	129	2	6	24	10	2	-
1,501 - 2,000	780	-	609	15	34	73	31	18	-
2,001 - 2,500	833	-	719	1	14	80	11	8	-
2,501 - 3,000	723	-	657	-	8	44	11	3	-
3,001 - 4,000	1,046	-	981	-	6	46	12	1	-
4,001 - 5,000	584	-	560	-	2	16	5	1	-
Over 5,001	611	-	588	-	-	18	3	2	-
<b>Totals</b>	<b>7,589</b>	<b>901</b>	<b>5,419</b>	<b>59</b>	<b>192</b>	<b>695</b>	<b>176</b>	<b>147</b>	

<b>Table A - 15</b>									
<b>Schedule of Retired Members by Benefit Option</b>									
Monthly Benefit	Total	Option Selected							
		Life	Option A		Option B		Option C	Child Benefit	
			Standard	Pop-Up	Standard	Pop-Up			
\$1 - \$300	94	41	19	7	-	-	3	24	
301 - 400	146	94	34	7	1	3	7	-	
401 - 500	135	81	40	7	-	1	6	-	
501 - 600	138	81	23	19	3	2	10	-	
601 - 700	168	101	35	21	2	3	6	-	
701 - 800	176	113	31	15	3	3	11	-	
801 - 900	186	91	45	22	5	10	13	-	
901 - 1,000	172	112	25	15	5	7	8	-	
1,001 - 1,100	196	128	37	19	2	4	6	-	
1,101 - 1,200	190	99	59	13	3	10	6	-	
1,201 - 1,300	161	79	39	28	3	9	3	-	
1,301 - 1,400	176	94	44	12	7	11	8	-	
1,401 - 1,500	173	95	40	14	5	14	5	-	
1,501 - 2,000	780	343	228	92	23	54	40	-	
2,001 - 2,500	833	357	250	103	30	65	28	-	
2,501 - 3,000	723	304	184	101	38	62	34	-	
3,001 - 4,000	1,046	408	335	119	40	95	49	-	
4,001 - 5,000	584	214	190	74	30	57	19	-	
Over 5,001	611	244	209	60	24	46	28	-	
<b>Totals</b>	<b>6,688</b>	<b>3,079</b>	<b>1,867</b>	<b>748</b>	<b>224</b>	<b>456</b>	<b>290</b>	<b>24</b>	
Deferred Vesteds	901								
Total	7,589								

\* Beneficiaries of members who selected Option C are listed under the Option C column. All other beneficiaries are listed under the Life column.

**APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS**

**Actuarial Assumptions**

The assumptions were adopted by the Board in August 2015 based on an experience study covering the period from July 1, 2009 through June 30, 2014 and our recommendations with the exception of the mortality assumptions which were adopted by the Board in October 2015.

**1. Discount Rate**

The discount rate of 7.50% is based on the expected return on assets and was first adopted by the Board in September 2013. For the stochastic projections, a standard deviation of 10.74% is assumed.

**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. In September 2013, the Board first adopted the current price inflation component. In August 2015, the Board adopted the current merit or longevity component.

Component	Adopted September 2013
Price inflation:	3.00%
Real wage growth	<u>0.50%</u>
Wage inflation	3.50%

The table below combines the various components of salary increases for sample ages.

Age	Price Inflation	Real Wage Growth	Merit or Longevity	Total
20	3.00%	0.50%	6.60%	10.10%
25	3.00%	0.50%	5.00%	8.50%
30	3.00%	0.50%	3.65%	7.15%
35	3.00%	0.50%	2.60%	6.10%
40	3.00%	0.50%	1.85%	5.35%
45	3.00%	0.50%	1.25%	4.75%
50	3.00%	0.50%	0.75%	4.25%
55	3.00%	0.50%	0.40%	3.90%
60	3.00%	0.50%	0.15%	3.65%
65	3.00%	0.50%	0.00%	3.50%

**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.

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS**

**4. 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. Future mortality improvements are reflected by applying the MP-2015 projection scale on a generational basis to adjusted based tables from the base year shown below.

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

Gender	Adjustment Factor	Base Year
Male	1.054	2009
Female	1.112	2009

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

Gender	Adjustment Factor	Base Year
Male	1.019	2009
Female	1.061	2009

c) Disabled Annuitant RP-2014 disabled retiree mortality table without MP-2014 projection

Gender	Adjustment Factor	Base Year
Male	0.984	2006
Female	1.038	2006

Age	Base Year Rates of Mortality at Selected Ages After Adjustment Factor					
	Healthy Non-annuitant		Healthy Annuitant		Disabled Annuitant	
	Male	Female	Male	Female	Male	Female
25	0.0425%	0.0244%	0.0310%	0.0220%	0.9553%	0.2563%
30	0.0520	0.0265	0.0410	0.0300	0.8233	0.2876
35	0.0605	0.0372	0.0640	0.0490	0.9749	0.4139
40	0.0796	0.0531	0.1170	0.0970	1.3126	0.6492
45	0.1126	0.0754	0.2410	0.2120	2.1145	1.0447
50	0.1646	0.1062	0.5320	0.4950	2.3941	1.2438
55	0.2421	0.1526	0.6360	0.4600	2.4866	1.5013
60	0.3545	0.2225	0.8170	0.5340	2.8111	1.9459
65	0.5092	0.3272	1.0560	0.7480	3.6312	2.5299
70	0.7089	0.4672	1.7660	1.2650	4.8812	3.4253
75	0.9646	0.6696	2.9830	2.1930	6.7010	4.9120
80	1.3394	1.0363	5.2760	3.6950	9.4261	7.2590
85	9.4290	6.6750	9.4290	6.6750	13.7102	10.8498
90	16.1860	12.3350	16.1860	12.3350	20.4562	15.8639
95	25.3150	20.8530	25.3150	20.8530	27.9623	22.6687

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS**

**5. Family Composition**

Upon the death of an active member, 90% are assumed to be married. Spouses of male members are assumed to be three years younger, and spouses of female members are assumed to be three years older.

**6. Rates of Termination**

Sample rates of termination are shown below.

<b>Rates of Termination*</b>						
<b>Age</b>	<b>Years of Service</b>					
	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5+</b>
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%

\* Termination rates do not apply once a member is eligible for retirement

**7. Rates of Disability**

The disability incidence rates are 0.960 times the CalPERS Public Agency Miscellaneous Ordinary Disability Incidence table for Males. Sample disability rates of active members are provided in the table below. These rates apply to both male and female COPERS members.

<b>Rates of Disability</b>	
<b>Age</b>	<b>Disability</b>
20	0.0163%
25	0.0163
30	0.0183
35	0.0471
40	0.1172
45	0.1834
50	0.2046
55	0.2122
60	0.2132

**CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015**

**APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS**

**8. Rates of Retirement**

Rates of retirement are based on age and service as shown in the table below.

<b>Rates of Retirement</b>				
<b>Age</b>	<b>Years of Service</b>			
	<b>&lt; 15</b>	<b>15-24</b>	<b>25-31</b>	<b>≥ 32</b>
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%

**9. 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.

**10. Post-Decrement Probabilities Assumption**

For all active members the following post-decrement probability assumptions apply:

- 50% of all Duty or Non-Duty related death or disability claims are assumed to receive a Modified Cash Refund annuity.
- 50% of all Duty or Non-Duty related death or disability claims are assumed to receive a refund of contributions.

**11. Member Contribution Crediting Rate**

Member contributions are credited with interest at 7.50% per annum.

**APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS**

**12. Changes Since Last Valuation**

The following assumptions were updated for the June 30, 2015 actuarial valuation:

- Merit salary increases
- Retirement rates
- Termination rates
- Disability rates
- Mortality rates

## APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS

### Contribution Allocation Procedure

The contribution allocation procedure primarily consists of an actuarial cost method, an asset smoothing method, and an amortization method as described below. The most recent changes were adopted by the Board in August 2015.

#### 1. Actuarial Cost Method

The entry age (EA) actuarial cost method was used for active employees, whereby the normal cost is computed as the level annual percentage of pay required to fund the retirement benefits between each member's date of entry and assumed retirement. The actuarial liability is the difference between the present value of future benefits and the present value of future normal cost. Or, equivalently, it is the accumulation of normal costs for all periods prior to the valuation date. The normal cost and actuarial liability are calculated on an individual basis. The sum of the individual amounts is the normal cost and actuarial liability for the System.

#### 2. Asset Valuation Method

For the purposes of determining contribution rates, an actuarial value of assets is used that dampens the volatility in market values that occur because of the fluctuations in market conditions. Use of an asset smoothing method reduces the volatility of contribution rates and is consistent with the long-term process of funding a pension plan.

The actuarial value of assets is calculated by recognizing the deviation of actual investment returns compared to the expected return on the actuarial value of assets over a four-year period. The dollar amount of the expected return on the actuarial value of assets is determined using the actual contributions and benefit payments during the year. Any difference between this amount and the actual net investment earnings is considered a gain or loss.

#### 3. Amortization Method

The unfunded actuarial liability (UAL) is the difference between the actuarial liability and the actuarial value of assets. The UAL is amortized over periods in accordance with the following amortization methods.

- 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.
- 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.

**APPENDIX B – ACTUARIAL ASSUMPTIONS AND METHODS**

- 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 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.
- 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.

The total contribution rate is the sum of the normal cost rate (including assumed administrative expenses) and the UAL rate. The normal cost rate is determined by dividing the total normal cost determined under the actuarial cost method by the payroll expected for members active on the valuation date. The UAL rate is determined by dividing the UAL payments determined under the amortization method described above by the total expected payroll for the year (including members active on the valuation date and new entrants expected to replace active members who are expected to leave employment). These rates are determined for the fiscal year immediately following the valuation date, but are applied one year later without adjustment.

For Tier 1, members contribute 5 percent of pay and the City contributes the remainder of the total contribution rate. For Tier 2, the members and the City each pay half of the total contribution rate until January 1, 2016. Thereafter, Tier 2 and Tier 3 members pay half of total contribution rate, not to exceed 11% of pay, and the City contributes the remainder of the total contribution rate.

**Changes Since Last Valuation**

Tier 2 and 3 member contribution rates were capped as of January 1, 2016 and the 2015 assumption changes are being amortized over 20 years with a 4-year phase-in.

**APPENDIX C – SUMMARY OF PLAN PROVISIONS**

**1. Membership**

Full-time employees of the City of Phoenix other than police officers or firefighters 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 January 1, 2016 who are not Tier 1 members or Tier 2 members are Tier 3 members.

**2. 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 beginning January 1, 2017.

**3. 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

**APPENDIX C – SUMMARY OF PLAN PROVISIONS**

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.

**4. 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).

*Minimum Benefit:*

Minimum monthly pension is \$250 (\$500 if member has 15 or more years of service).

*Tier 2/Tier 3*

*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.

**5. Deferred Retirement**

*Eligibility:*

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

**APPENDIX C – SUMMARY OF PLAN PROVISIONS**

*Annual Benefit:*

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

**6. 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 based 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.

**7. Non-Duty Disability**

*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 based on FAC and credited service at time of disability retirement.

**8. Duty Death Before Retirement**

*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.

**9. Non-Duty Death Before Retirement**

*Eligibility:*

10 or more years of credited service.

*Annual Benefit:*

Same as Duty Death Before Retirement.

**APPENDIX C – SUMMARY OF PLAN PROVISIONS**

**10. Refund of Contributions**

*Eligibility:*

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

*Benefit:*

Accumulated member contributions with interest.

**11. 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 January 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 at least be 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.

**12. Total Required Annual Contribution**

Actuarially determined normal cost plus an amortization payment on the unfunded actuarial liability stated as a percentage of projected member compensation

CITY OF PHOENIX EMPLOYEES' RETIREMENT SYSTEM  
ACTUARIAL VALUATION REPORT AS OF JUNE 30, 2015

APPENDIX C – SUMMARY OF PLAN PROVISIONS

**13. Member Contributions**

Tier 1: 5% of pay  
Tier 2/Tier 3: 50% of total contribution rate, not to exceed 11% of pay on or after  
January 1, 2016

**14. City Contributions**

Total Required Annual Contribution less Member Contributions

**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 provisions, the actuary should immediately be alerted so the proper provisions are valued.**

**APPENDIX D – GLOSSARY OF TERMS**

**1. Actuarial Liability**

The Actuarial Liability is the difference between the present value of all future plan benefits and the present value of total future normal costs. It represents the amount of assets the System should have today according to the allocation of costs in the actuarial cost method. It is also referred to by some actuaries as the “accrued liability” or “actuarial accrued liability.”

**2. Actuarial Assumptions**

Estimates of future experience with respect to rates of mortality, disability, turnover, retirement rate or rates of investment income and salary increases. Actuarial assumptions (rates of mortality, disability, turnover, and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (salary increases and investment income) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.

**3. Actuarial Cost Method**

A mathematical budgeting procedure for allocating the dollar amount of the actuarial present value of a retirement Plan benefit between future normal cost and actuarial accrued liability. Sometimes referred to as the “actuarial funding method.”

**4. Actuarial Gain or Loss**

The difference between actual experience and assumed experience.

**5. Actuarial Present Value**

The amount of funds currently estimated to be required to provide a payment or series of payments in the future. It is determined by discounting future payments at predetermined rates of interest, and by probabilities of payment.

**6. Actuarially Determined Contribution**

A target or recommended contribution for the reporting period, determined in conformity with Actuarial Standards of Practice based on the most recent measurement available when the contribution for the reporting period was adopted.

**7. Amortization**

Paying off an interest-discounted amount with periodic payments of interest and principal — as opposed to paying off with a lump sum payment.

**APPENDIX D – GLOSSARY OF TERMS**

**8. Deferred Inflow of Resources**

An acquisition of net assets by a government employer that is applicable to a future reporting period. In the context of GASB 68, these are experience gains on the Total Pension Liability, assumption changes reducing the Total Pension Liability, or investment gains that are recognized in future reporting periods.

**9. Deferred Outflow of Resources**

A consumption of net assets by a government employer that is applicable to a future reporting period. In the context of GASB 68, these are experience losses on the Total Pension Liability, assumption changes increasing the Total Pension Liability, or investment losses that are recognized in future reporting periods.

**10. Entry Age Actuarial Cost Method**

The actuarial cost method selected for funding calculations and required for GASB 67 and 68 calculations. Under this method, the actuarial present value of the projected benefits of each individual included in an actuarial valuation is allocated on a level basis over the earnings of the individual between entry age and assumed exit ages. The portion of this actuarial present value allocated to a valuation year is called the Normal Cost (Service Cost for GASB 67 and 68). The portion of this actuarial present value not provided for at a valuation date by the actuarial present value of future normal costs is called the Actuarial Liability (Total Pension Liability for GASB 67 and 68).

**11. Measurement Date**

The date as of which the Total Pension Liability and Plan Fiduciary Net Position are measured. The Total Pension Liability may be projected from the Actuarial Valuation Date to the Measurement Date. The Measurement Date must be the same as the Reporting Date for the plan.

**12. Net Pension Liability**

The liability of employers and nonemployer contributing entities to employees for benefits provided through a defined benefit pension plan. It is calculated as the Total Pension Liability less the Plan Fiduciary Net Position.

**13. Normal Cost**

The actuarial present value of retirement Plan benefits allocated to the current year by the actuarial cost method.

**APPENDIX D – GLOSSARY OF TERMS**

**14. Plan Fiduciary Net Position**

The fair or market value of assets.

**15. Reporting Date**

The last day of the plan or employer's fiscal year.

**16. Service Cost**

The portion of the actuarial present value of projected benefit payments that is attributed to the current period of employee service in conformity with the requirements of GASB 67 and 68. The Service Cost is the normal cost calculated under the entry age actuarial cost method.

**17. Total Pension Liability**

The portion of the actuarial present value of projected benefit payments that is attributed to past periods of employee service in conformity with the requirements of GASB 67 and 68. The Total Pension Liability is the actuarial liability calculated under the entry age actuarial cost method.

**18. Unfunded Actuarial Liability (UAL)**

The unfunded actuarial liability represents the difference between the actuarial liability and the assets. It can be measured either based on the actuarial value of assets or the market value of assets. This value is sometimes referred to as the "unfunded actuarial accrued liability."