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# *Public Education Employee Retirement System of Missouri*

Actuarial Valuation as of  
June 30, 2016



October 20, 2016

Board of Trustees  
Public Education Employee Retirement System of Missouri  
3210 W. Truman Blvd.  
Jefferson City, MO 65109

**Re: Certification of the Actuarial Valuation of the Public Education Employee Retirement System of Missouri as of June 30, 2016**

Dear Board of Trustees:

An actuarial valuation is performed annually for the Public Education Employee Retirement System of Missouri ("PEERS") defined benefit pension plan ("Plan"). The results of the latest actuarial valuation were prepared as of June 30, 2016 and are presented herein pursuant to the engagement letter between PEERS and PricewaterhouseCoopers LLP ("PwC"), dated June 9, 2014, and amended April 16, 2015. This report is intended to provide the Board of Trustees ("Board") with information on the funded status of the Plan, development of the actuarially determined contribution rates, and certain financial statement disclosure information.

**Financing Objectives and Funding Policy**

Under Missouri statutes, contribution rates are adopted annually by the Board. The recommended contribution rate presented herein was actuarially determined based on the funding policy, actuarial assumptions, and actuarial methods adopted by the Board and summarized herein.

In setting contribution rates, the principal objectives of the Board's funding policy are:

- To set contribution rates such that the funded ratio will reach 100% over a closed 30-year period.
- To set contribution rates such that they remain stable over time.
- To set contribution rates such that they promote intergenerational equity.
- To provide a reasonable margin for adverse experience to help offset risks.

**Progress Toward Realization of Financing Objectives**

The funded ratio (the ratio of the actuarial value of assets to the actuarial accrued liability) is a standard measure of a Plan's funded status. It should increase over time until it reaches 100% under the funding policy, though adverse experience could prevent this from being achieved. The funded ratio for the Plan decreased by 0.4% from the preceding year to 86.4%, primarily due to the recognition of lower than expected returns from prior years in the AVA development and changes in assumptions pursuant to the experience study completed in June 2016, but partially offset by favorable salary experience and lower than assumed COLA.

**Benefit Provisions**

The benefit provisions reflected in the valuation reports are those which were in effect at June 30, 2016, as set forth in the related Missouri statutes. It is our understanding that there were no changes in benefit provisions that would impact the valuation.

**Assets and Member Data**

The valuation was based on asset values of the trust fund and member census data as of June 30, 2016. All asset information and member data were provided by PEERS. While certain checks for reasonableness were performed, the data was used unaudited. The accuracy of the results presented in this report is dependent upon the accuracy and completeness of the underlying asset and census information.

**Actuarial Assumptions and Methods**

The actuarial assumptions used in the June 30, 2016 valuations were adopted by the Board pursuant to an experience study completed in June 2016. All economic and demographic assumptions were reviewed and updated, where appropriate, based on the results of the experience study completed in June 2016. The next experience study is scheduled to be completed prior to the June 30, 2021 valuation.



We believe the actuarial assumptions and methods are reasonable for the purposes of this valuation report, were developed in accordance with the Actuarial Standards of Practice, and comply with the parameters set forth in Statements No. 67 and No. 68 of the Governmental Accounting Standards Board ("GASB"). Different assumptions and methods may be reasonable for other purposes. As such, the results presented in the valuation reports should only be relied upon for the intended purpose.

**Certification**

We certify that the information presented herein is accurate and fairly portrays the actuarial position of the Plan administered by PEERS as of June 30, 2016 based on the underlying census data, asset information and selected assumptions and methods.

This report contains certain accounting information required to be included in the System's Comprehensive Annual Financial Report. This information has been prepared in accordance with our understanding of GASB No.67. This report also contains employer accounting information prepared in accordance with our understanding of GASB No. 68.

To the best of our knowledge this actuarial statement is complete and accurate and has been prepared in accordance with generally accepted actuarial principles and practices and with the Actuarial Standards of Practice issued by the Actuarial Standards Board. Our calculations also reflect our understanding of the requirements of Missouri state law. The undersigned actuaries are members of the Society of Actuaries and other professional organizations, including the American Academy of Actuaries, and meet the Qualification Standards for Actuaries Issuing Statements of Actuarial Opinion in the United States relating to pension plans. There is no relationship between the PwC practitioners involved in this engagement and PEERS that may impair our objectivity.

The content of this document is limited to the matters specifically addressed herein and does not address any other potential tax consequences, or the potential application of tax penalties, to any matter other than as set forth herein. Our conclusions are not binding upon any taxing authority or the courts and there is no assurance that any relevant taxing authority will not successfully assert a contrary position. In addition, no exceptions (including the reasonable cause exception) are available for any federal or state penalties imposed if any portion of a transaction is determined to lack economic substance or fails to satisfy any similar rule of law, and our advice will not protect you from any such penalties. This document supersedes all prior written or oral advice with respect to the issues addressed in this document and all such prior communications should not be relied upon by any person for any purpose. This document has been prepared pursuant to an engagement letter between PEERS and PwC, and is intended solely for the use and benefits of PEERS and not for reliance by any other person.

Respectfully submitted,

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## SECTION I - EXECUTIVE SUMMARY

### **HIGHLIGHTS OF THE ACTUARY'S REPORT**

This report presents the results of the actuarial valuation of the Public Education Employee Retirement System of Missouri ("PEERS") defined benefit plan ("Plan") as of June 30, 2016 and has been prepared to present the current funded status of the Plan, contribution requirements for fiscal year 2018 (July 1, 2017 through June 30, 2018), and certain financial statement disclosure information. The valuation was performed using census data for plan members as of June 30, 2016 provided by PEERS and summarized in Section IV of this report, asset information as of June 30, 2016 provided by PEERS, the actuarial assumptions and methods approved by the Board and summarized in Section V, and the plan provisions effective June 30, 2016 summarized in Section VI.

#### **Contributions**

The Board sets, at its discretion and subject to certain restrictions, the applicable employer and member contribution rates upon considering the results of the actuarial valuation and other analysis as appropriate. Based on the objectives of the Board's funding policy, our valuation of the Actuarially Determined Contribution Rate, and the assumptions and methods approved by the Board, the recommended contribution rate is 13.72% (6.86% for employers and 6.86% for members) for fiscal year 2018. A contribution rate of 13.72% represents no change from the rate currently in effect for fiscal year 2017. The contribution rate approved by the Board becomes effective on July 1, 2017. Therefore, the dollar cost will depend on the actual payroll during fiscal year 2018.

Members of PEERS pay half of the total contribution rate, currently 6.86% of pay. If a member terminates employment with less than 5 years of service, their accumulated contributions with interest can be withdrawn as a lump sum, or the member may direct PEERS to make a direct rollover of the distribution amount. When a member becomes vested with at least 5 years of service, the member also has the option to leave their contributions in the Plan and select from various retirement annuity options commencing at retirement age.

#### **Funded Status**

The funded status of PEERS is measured as the ratio of assets available for benefits to a benefit liability measure for the System. While there are several such measures that could be appropriately used, the benefit liability measure that ties most closely to the funding strategy is the Actuarial Accrued Liability ("AAL") computed in accordance with the assumptions and methods summarized in Section V.

Using the Actuarial Value of Assets ("AVA"), a smoothed asset value that recognizes 20% of the total investment gain or loss on the AVA for each of the preceding five (5) years, the PEERS AAL funded ratio decreased from 86.8% at June 30, 2015 to 86.4% as of June 30, 2016. The decrease is primarily due to the recognition of lower than expected returns from prior years in the AVA development and changes in assumptions pursuant to the experience study completed in June 2016, but partially offset by favorable salary experience and lower than assumed COLA.

#### **Investment Experience**

The market value of the assets available for benefits has increased from \$3.98 billion as of June 30, 2015 to \$4.01 billion as of June 30, 2016. The actuarial value of assets increased from \$3.92 billion as of June 30, 2015 to \$4.16 billion as of June 30, 2016. The actuarial value of assets is more than the market value by \$0.15 billion and the difference will be recognized over the next four years.

The assets of the Plan returned 1.8% (1.6% net of all expenses) for the year ended June 30, 2016. Based on the Actuarial Value of Assets, the approximate return for the same period was 7.0%. The return on actuarial value is different due to the smoothing of returns greater or less than expected returns over five years. For GASB accounting purposes, the money-weighted return, net of investment expenses only, was also 1.6%.

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## SECTION I - EXECUTIVE SUMMARY

### **HIGHLIGHTS OF THE ACTUARY'S REPORT (CONTINUED)**

#### **Funding Policy**

The Board has adopted a formal funding policy with the objective of fully funding the system over a closed 30-year period while adhering to the applicable statutes of the State of Missouri, as well as sound financial principles, such as maintaining contribution rate stability and intergenerational equity, and the applicable statutes of the State of Missouri. The policy sets forth certain actions, actuarial assumptions and actuarial methods that are to be utilized in executing the funding strategy. The funding policy is summarized in Section II.

#### **Governmental Accounting Standards**

This report contains certain financial statement information, including notes and required supplemental information, prepared in accordance with our understanding of Governmental Accounting Standards No. 67 and No. 68 ("GASB 67" and "GASB 68"). Information prepared in accordance with GASB 67 is intended to assist PEERS with the preparation of its Comprehensive Annual Financial Report. Information shown in this report prepared in accordance with GASB 68 are the collective amounts for all participating employers in aggregate. Further calculation is required to determine the proportionate share applicable to each participating employer.

#### **Changes in Actuarial Assumptions**

An experience study was completed in June 2016 resulting in an update to the following assumptions:

The **inflation** assumption decreased from 2.50% to 2.25% per year.

The **payroll growth** assumption decreased from 3.75% to 3.25% per year.

The **future salary increase** assumption decreased from 5.00%-12.00%, depending on service to 4.00%-11.00%, depending on service.

The **investment return** assumption decreased from 8.00% to 7.75% per year.

The **active mortality** assumption changed from the RP 2000 Mortality Table set back one year for males and six years for females, then projected to 2016 using Scale AA to 75% of the RP-2006 Total Dataset Mortality Tables with static projection to 2028 using the 2014 SSA Improvement Scale.

The **non-disabled retiree mortality** assumption changed from the RP 2000 Mortality Table set forward one year for males and no set back/forward for females, then projected to 2016 using Scale AA to the RP-2006 Total Dataset Mortality Tables with plan-specific experience adjustments and static projection to 2028 using the 2014 SSA Improvement Scale.

The **disabled retiree mortality** assumption changed from the RP 2000 Disabled Retiree Mortality Table to the RP-2006 Disabled Retiree Mortality Tables with static projection to 2028 using the 2014 SSA Improvement Scale.

The **withdrawal** assumption is a service-based table of rates. The rates from 0 to 13 years of service were increased to reflect recent experience.

The **disability** assumption is an age-based table of rates. The rates at certain ages were increased to reflect recent experience.

The **retirement** assumption is an age and service based table of rates. The rates at certain ages were increased or decreased to reflect recent experience.

The **refund of contributions** assumption was adjusted to reflect that active and inactive members who terminate with 5 or more years of service, but prior to satisfying the age and service requirements for service retirement, will select the option that has the greater present value between an immediate refund and a deferred annuity.

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SECTION I - EXECUTIVE SUMMARY

**HIGHLIGHTS OF THE ACTUARY'S REPORT (CONTINUED)**

**Changes in Actuarial Assumptions (Continued)**

The **dependent** assumptions for active members (pre-retirement) were adjusted to reflect recent experience.

The **beneficiary age** assumption for retired members (post-retirement) was adjusted to reflect recent experience.

The **return of unused member account balance** assumption was changed to explicitly value the cash refund.

In addition, the Board adopted a new COLA policy during fiscal 2016 resulting in a decrease in the future COLA assumption from 2.00% per year to a variable, increasing assumption of 1.00%-1.50% over ten years beginning January 1, 2018.

Please refer to the experience study report dated June 2, 2016, and the Board resolution related to the COLA policy for more details.

**Changes in Plan Provisions**

It is our understanding that there were no changes to the Plan that impacted the pension benefits during the fiscal year.

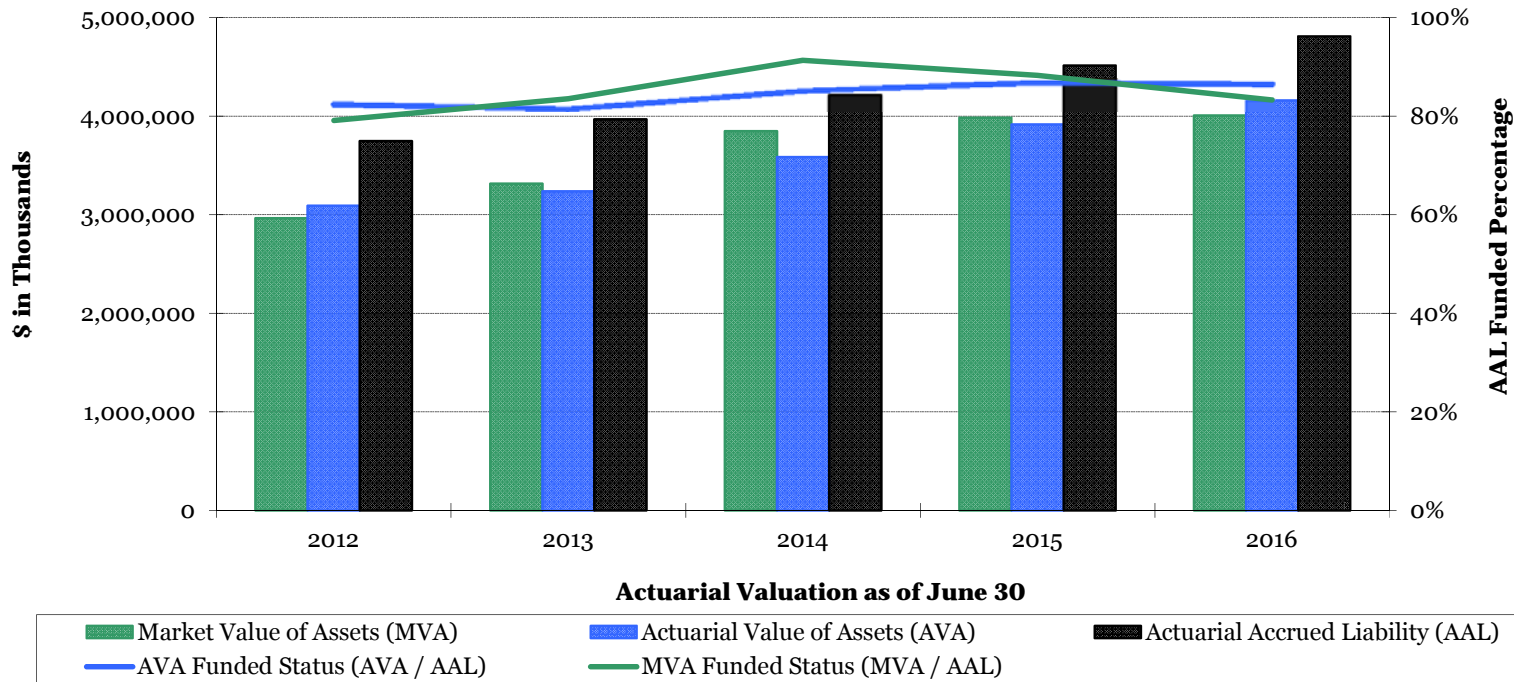
**Changes in Actuarial Methods**

There were no changes in the actuarial methods for the June 30, 2016 valuation.

SECTION I - EXECUTIVE SUMMARY

HISTORICAL SUMMARY

**PEERS – 5 Year History of Funded Status**



**Actuarial Valuation as of June 30:**

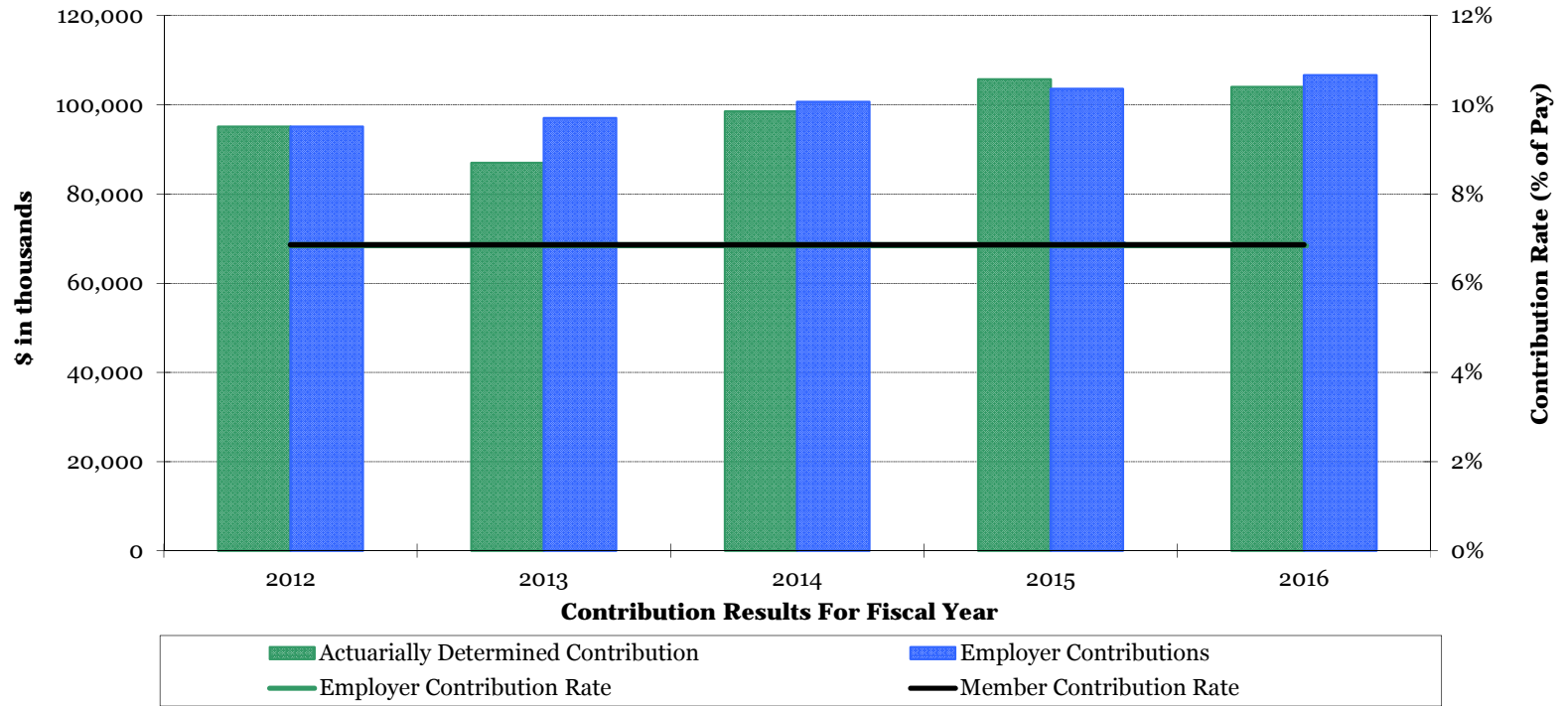
<b><u>(\$ in '000's)</u></b>	<b><u>2012</u></b>	<b><u>2013</u></b>	<b><u>2014</u></b>	<b><u>2015</u></b>	<b><u>2016</u></b>
Actuarial Accrued Liability (AAL)	\$3,746,347	\$3,967,619	\$4,211,489	\$4,512,317	\$4,809,666
Actuarial Value of Assets (AVA)	\$3,090,880	\$3,237,200	\$3,584,719	\$3,915,199	\$4,157,427
Market Value of Assets (MVA)	\$2,964,557	\$3,316,513	\$3,846,323	\$3,983,411	\$4,007,331
Unfunded Liability (AAL - AVA)	\$655,467	\$730,419	\$626,770	\$597,118	\$652,239
AVA Funded Status (AVA / AAL)	82.5%	81.6%	85.1%	86.8%	86.4%
MVA Funded Status (MVA / AAL)	79.1%	83.6%	91.3%	88.3%	83.3%



SECTION I - EXECUTIVE SUMMARY

HISTORICAL SUMMARY (CONTINUED)

**PEERS – 5 Year History of Contributions**



**Contribution Results For Fiscal Year:**

<b>(\$ in '000's)</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>
Actuarially Determined Contribution	\$95,094.8	\$87,013.8	\$98,497.8	\$105,739.1	\$104,011.6
Employer Contributions	\$95,094.8	\$97,059.3	\$100,699.7	\$103,624.3	\$106,654.6
ADC % Contributed	100.0%	111.5%	100.3%	98.0%	102.5%
Employer Contribution Rate	6.86%	6.86%	6.86%	6.86%	6.86%
Member Contribution Rate	6.86%	6.86%	6.86%	6.86%	6.86%

SECTION I - EXECUTIVE SUMMARY

**HISTORICAL SUMMARY (CONTINUED)**

**Summary of Valuation Results<sup>1</sup>**

<b><u>Valuation Date</u></b>	<b><u>June 30, 2012</u></b>	<b><u>June 30, 2013</u></b>	<b><u>June 30, 2014</u></b>	<b><u>June 30, 2015</u></b>	<b><u>June 30, 2016</u></b>
Development of Actuarially Determined Contribution Rate:					
1. Anticipated Payroll	\$ 1,437,310,138	\$ 1,470,829,580	\$ 1,442,700,979	\$ 1,469,771,528	\$ 1,519,081,146
2. Total Normal Cost: <sup>2</sup>					
a. Amount	\$ 155,067,161	\$ 159,672,364	\$ 156,599,641	\$ 161,391,660	\$ 150,975,958
b. Percentage of Payroll	10.79%	10.86%	10.85%	10.98%	9.94%
3. Total Unfunded Actuarial Accrued Liability Annual Amortizations: <sup>3</sup>					
a. Amount	\$ 39,970,396	\$ 44,064,744	\$ 38,917,522	\$ 38,075,050	\$ 41,637,462
b. Percentage of Payroll	2.78%	3.00%	2.70%	2.59%	2.74%
4. Total Actuarially Determined Contribution Rate:					
a. Percentage of Payroll: (2)(b) + (3)(b)	<b>13.57%</b>	<b>13.86%</b>	<b>13.55%</b>	<b>13.57%</b>	<b>12.68%</b>
b. Effective UAAL Amortization Period	29.1 Years	28.3 Years	26.8 Years	25.6 Years	24.9 Years
5. Recommended Total Contribution Rate, Member + Employer:					
a. Percentage of Payroll	<b>13.72%</b>	<b>13.72%</b>	<b>13.72%</b>	<b>13.72%</b>	<b>13.72%</b>
b. Effective UAAL Amortization Period	26.4 Years	31.0 Years	24.1 Years	23.2 Years	15.1 Years
c. Effective Date	July 1, 2013	July 1, 2014	July 1, 2015	July 1, 2016	July 1, 2017

<sup>1</sup> The contribution rates shown were developed on a funding basis only and do not reflect accounting requirements.

<sup>2</sup> The Normal Cost shown for years prior to June 30, 2016 is mid-year and includes a 1.50% load for anticipated losses on service purchases. The Normal Cost shown for June 30, 2016 is as of the beginning of the year and includes a 1.50% load for anticipated losses on service purchases. As a suggestion noted in the 2016 actuarial audit, this methodology was refined for June 30, 2016 and approved by PEERS.

<sup>3</sup> The Unfunded Actuarial Accrued Liability (UAAL) Amortization shown for years prior to June 30, 2016 is mid-year. The UAAL Amortization for June 30, 2016 is as of the beginning of the year. As a suggestion noted in the 2016 actuarial audit, this methodology was refined for June 30, 2016 and approved by PEERS.

SECTION I - EXECUTIVE SUMMARY

**HISTORICAL SUMMARY (CONTINUED)**

**Summary of Valuation Results (Continued)**

	<u>June 30, 2012</u>	<u>June 30, 2013</u>	<u>June 30, 2014</u>	<u>June 30, 2015</u>	<u>June 30, 2016</u>
Census Information					
Active					
Number <sup>1</sup>	48,605	48,709	45,589	46,835	47,851
Average Age	48.1	48.1	48.6	48.4	48.3
Average Years of Service	8.4	8.5	8.9	8.7	8.6
Anticipated Payroll of Actives (\$ in 000's) <sup>2</sup>	\$ 1,437,310	\$ 1,470,830	\$ 1,442,701	\$ 1,469,772	\$ 1,519,081
Inactive Members					
Vested					
Number <sup>3</sup>	4,940	5,140	6,131	6,193	6,246
Annual Deferred Annuities	\$ 16,247,408	\$ 17,446,096	\$ 22,283,846	\$ 23,155,969	\$ 23,052,099
Non Vested					
Number	9,615	9,299	10,084	10,326	10,721
Account Balance	\$ 18,059,443	\$ 18,843,912	\$ 22,208,522	\$ 22,765,714	\$ 20,227,362
Former Members					
Entitled to a Deferred Annuity					
Number		41	63	117	213
Account Balance		\$ 186,326	\$ 229,540	\$ 606,562	\$ 583,480
Entitled to a Refund of Contributions					
Number	13,637	14,032	15,122	14,419	14,397
Account Balance	\$ 10,355,388	\$ 11,122,418	\$ 13,411,695	\$ 13,316,970	\$ 12,827,071
Retiree/Beneficiary/Disabled					
Number	22,562	23,674	25,029	26,298	27,583
Annual Benefits Payable (\$ in 000's) <sup>4</sup>	\$ 178,933	\$ 174,468	\$ 191,823	\$ 210,547	\$ 229,005

<sup>1</sup> The number of active members as of June 30, 2016 includes 972 members who retired in July 2016.

<sup>2</sup> Figures shown are the anticipated payroll for the one-year period following the valuation date. For the June 30, 2016 valuation, anticipated payroll excludes 972 members who retired in July 2016.

<sup>3</sup> The number of inactive vested members as of June 30, 2016 includes 57 members who retired in July 2016.

<sup>4</sup> The annual benefits payable as of June 30, 2016 does not include 1,029 members who retired in July 2016.

SECTION I - EXECUTIVE SUMMARY

**HISTORICAL SUMMARY (CONTINUED)**

**Summary of Valuation Results (Continued)**

	<u>June 30, 2012</u>	<u>June 30, 2013</u>	<u>June 30, 2014</u>	<u>June 30, 2015</u>	<u>June 30, 2016</u>
<b>Present Value of Future Benefits</b>					
Member Contribution Balances	\$ 822,485,255	\$ 862,034,650	\$ 894,649,839	\$ 892,546,847	\$ 926,273,575
Retiree/Beneficiary	1,511,437,961	1,620,392,250	1,826,696,310	1,987,643,620	2,151,723,215
Disabled	30,103,316	33,221,037	34,878,711	53,003,458	53,604,390
Inactive	37,758,244	43,351,365	54,693,962	57,572,798	73,543,298
Active	<u>2,564,966,424</u>	<u>2,646,723,060</u>	<u>2,606,097,222</u>	<u>2,771,197,529</u>	<u>2,692,310,897</u>
Total	\$ 4,966,751,200	\$ 5,205,722,362	\$ 5,417,016,044	\$ 5,761,964,252	\$ 5,897,455,375
<b>Actuarial Accrued Liability (AAL)</b>					
Member Contribution Balances	\$ 822,485,255	\$ 862,034,650	\$ 894,649,839	\$ 892,546,847	\$ 926,273,575
Retiree/Beneficiary	1,511,437,961	1,620,392,250	1,826,696,310	1,987,643,620	2,151,723,215
Disabled	30,103,316	33,221,037	34,878,711	53,003,458	53,604,390
Inactive	37,758,244	43,351,365	54,693,962	57,572,798	73,543,298
Active	<u>1,344,562,530</u>	<u>1,408,619,450</u>	<u>1,400,570,010</u>	<u>1,521,550,256</u>	<u>1,604,521,479</u>
Total	\$ 3,746,347,306	\$ 3,967,618,752	\$ 4,211,488,832	\$ 4,512,316,979	\$ 4,809,665,957
<b>Actuarial Value of Assets (AVA)</b>					
Member Contribution Balances	\$ 822,485,255	\$ 862,034,650	\$ 894,649,839	\$ 892,546,847	\$ 926,273,575
Retiree/Beneficiary	1,511,437,961	1,620,392,250	1,826,696,310	1,987,643,620	2,151,723,215
Disabled	30,103,316	33,221,037	34,878,711	53,003,458	53,604,390
Inactive	37,758,244	43,351,365	54,693,962	57,572,798	73,543,298
Active	<u>689,095,192</u>	<u>678,200,253</u>	<u>773,800,411</u>	<u>924,432,390</u>	<u>952,282,067</u>
Total	\$ 3,090,879,968	\$ 3,237,199,555	\$ 3,584,719,233	\$ 3,915,199,113	\$ 4,157,426,545
<b>Unfunded Actuarial Accrued Liability: AAL - AVA <sup>1</sup></b>					
Member Contribution Balances	\$ -	\$ -	\$ -	\$ -	\$ -
Retiree/Beneficiary	-	-	-	-	-
Disabled	-	-	-	-	-
Inactive	-	-	-	-	-
Active	<u>655,467,338</u>	<u>730,419,197</u>	<u>626,769,599</u>	<u>597,117,866</u>	<u>652,239,412</u>
Total	\$ 655,467,338	\$ 730,419,197	\$ 626,769,599	\$ 597,117,866	\$ 652,239,412
<b>Funded Percentage: AVA / AAL <sup>1</sup></b>					
Member Contribution Balances	100.0%	100.0%	100.0%	100.0%	100.0%
Retiree/Beneficiary	100.0%	100.0%	100.0%	100.0%	100.0%
Disabled	100.0%	100.0%	100.0%	100.0%	100.0%
Inactive	100.0%	100.0%	100.0%	100.0%	100.0%
Active	<u>51.3%</u>	<u>48.1%</u>	<u>55.2%</u>	<u>60.8%</u>	<u>59.3%</u>
Total	82.5%	81.6%	85.1%	86.8%	86.4%
<b>Market Value of Assets</b>	\$ 2,964,557,038	\$ 3,316,512,798	\$ 3,846,322,885	\$ 3,983,410,820	\$ 4,007,330,673
<b>Summary of Assumptions <sup>2</sup></b>					
Valuation Interest Rate	8.00%	8.00%	8.00%	8.00%	7.75%
Salary Increases	5.00% - 12.00%	5.00% - 12.00%	5.00% - 12.00%	5.00% - 12.00%	4.00% - 11.00%
Cost-of-Living Assumption	2.00%	2.00%	2.00%	2.00%	1.00% - 1.50%

<sup>1</sup> In determining the funded percentage, the assets are allocated first to member contribution balances, then to the retiree/beneficiary/disabled liability, then to the inactive liability, and then to the active liability. This does not represent a legal allocation of assets.

<sup>2</sup> The Board of Trustees adopted several assumption changes for the June 30, 2016 valuation pursuant to a comprehensive experience study completed in June 2016.

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## SECTION II - FUNDING

### **FUNDING**

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## SECTION II - FUNDING

### **A. Summary of Funding Policy**

#### **Introduction**

The Board of Trustees ("Board") for the Public Education Employee Retirement System of Missouri (PEERS) has adopted a funding policy to record the funding objectives and help ensure the systematic funding of future benefit payments for members of PEERS. The funding policy governs the methods used in performing the actuarial valuation, which is the basis for determining the annual contribution rate for both employers and members. The funding policy shall be updated every five years in conjunction with an experience study. Other changes to the funding policy may be considered in the interim as recommended by the actuary. The funding policy was last revised on June 14, 2016, with all changes effective for the June 30, 2016 actuarial valuations.

The "Funding" results presented in this section of the report were prepared in accordance with the funding policy.

#### **Funding Objective**

The funding objective is to achieve a funded ratio of 100% over a closed 30-year period. For this purpose, the funded ratio is defined as the Actuarial Value of Assets divided by the Actuarial Accrued Liability determined under the Entry Age Normal Level Percent cost method and the actuarial assumptions adopted by the Board.

#### **Principles of Funding**

1. Maintain adequate assets so that current plan assets plus future contributions and investment earnings should be sufficient to fund all benefits expected to be paid to members and their beneficiaries.
2. Maintain stability of contribution rates, consistent with other funding objectives.
3. Maintain public policy goals of accountability and transparency. Each policy element is clear in intent and effect, and each should allow an assessment of whether, how and when the funding requirements of the plan will be met.
4. Promote intergenerational equity. Each generation of members and employers should incur the cost of benefits for the employees who provide services to them, rather than deferring those costs to future members and employers.
5. Provide a reasonable margin for adverse experience to help offset risks.
6. Review the investment earning assumption in conjunction with the periodic asset liability study and in consideration of the Board's risk profile.
7. Review demographic and economic assumptions in conjunction with an experience study performed by an actuary.
8. Continue progress of systematic reduction of the Unfunded Actuarial Accrued Liabilities (UAAL) while keeping the member and employer contribution rates at or near 6.86% of pay, the contribution rates paid during 2010-2011.

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## SECTION II - FUNDING

### **A. Summary of Funding Policy (Continued)**

#### **Annual Actuarial Valuation to Set Contribution Rates**

In accordance with statute, annual actuarial valuations of the System's assets and liabilities shall be performed by an actuary. The contribution rate shall be established based on the results of these valuations. The funding policy requires that the Actuarially Determined Contribution ("ADC") Rate is equal to the sum of the employer Normal Cost Rate and the Unfunded Actuarial Accrued Liability ("UAAL") Amortization Rate. The Normal Cost Rate is the portion of the Present Value of Future Benefits allocated to the year following the Actuarial Valuation Date by the Actuarial Cost Method, as a percentage of payroll. The Unfunded Actuarial Accrued Liability (UAAL) Amortization Rate is the difference between the Actuarial Accrued Liability and Actuarial Value of Assets as of the valuation date, as a percentage of payroll. The contribution rates shall be approved by the Board no later than December 31st for the upcoming school year.

The Board, at its discretion (and to the extent permitted by law), may authorize a change in the member and employer contribution rates from one year to the next should the actuary determine that the contribution rates currently in effect are more or less than required to fully fund the plan over the weighted-average period of the existing UAAL amortization bases established in accordance with the funding policy. The decision by the Board will be based on the expected number of years required to fully fund under the current contribution rates. The contribution rates cannot be increased by more than 0.5% (0.25% for employers and 0.25% for members) per year.

SECTION II - FUNDING

**B. Development of Funded Status**

	<u>June 30, 2015</u>	<u>June 30, 2016</u>
1. Present Value of Future Benefits		
a. Member Contribution Balances	\$ 892,546,847	\$ 926,273,575
b. Retirees, Beneficiaries, and Disableds	2,040,647,078	2,205,327,605
c. Inactives	57,572,798	73,543,298
d. Actives	<u>2,771,197,529</u>	<u>2,692,310,897</u>
e. Total: (1)(a) + (1)(b) + (1)(c) + (1)(d)	\$ 5,761,964,252	\$ 5,897,455,375
2. Actuarial Accrued Liability		
a. Member Contribution Balances	\$ 892,546,847	\$ 926,273,575
b. Retirees, Beneficiaries, and Disableds	2,040,647,078	2,205,327,605
c. Inactives	57,572,798	73,543,298
d. Actives	<u>1,521,550,256</u>	<u>1,604,521,479</u>
e. Total: (2)(a) + (2)(b) + (2)(c) + (2)(d)	\$ 4,512,316,979	\$ 4,809,665,957
3. Actuarial Value of Assets <sup>1</sup>		
a. Member Contribution Balances	\$ 892,546,847	\$ 926,273,575
b. Retirees, Beneficiaries, and Disableds	2,040,647,078	2,205,327,605
c. Inactives	57,572,798	73,543,298
d. Actives	<u>924,432,390</u>	<u>952,282,067</u>
e. Total: (3)(a) + (3)(b) + (3)(c) + (3)(d)	\$ 3,915,199,113	\$ 4,157,426,545
4. Unfunded Actuarial Accrued Liability <sup>1</sup>		
a. Member Contribution Balances: (2)(a) - (3)(a)	\$ -	\$ -
b. Retirees, Beneficiaries, and Disableds: (2)(b) - (3)(b)	-	-
c. Inactives: (2)(c) - (3)(c)	-	-
d. Actives: (2)(d) - (3)(d)	<u>597,117,866</u>	<u>652,239,412</u>
e. Total: (2)(e) - (3)(e)	\$ 597,117,866	\$ 652,239,412
5. Funded Percentage <sup>1</sup>		
a. Member Contribution Balances: (3)(a)/(2)(a)	100.0%	100.0%
b. Retirees, Beneficiaries, and Disableds: (3)(b)/(2)(b)	100.0%	100.0%
c. Inactives: (3)(c)/(2)(c)	100.0%	100.0%
d. Actives: (3)(d)/(2)(d)	<u>60.8%</u>	<u>59.3%</u>
e. Total: (3)(e)/(2)(e)	86.8%	86.4%

<sup>1</sup> In determining the funded percentage, the assets are allocated first to member contribution balances, then to the retiree/beneficiary/disabled liability, then to the inactive liability, and then to the active liability. This does not represent a legal allocation of assets.



SECTION II - FUNDING

**C. Unfunded Actuarial Accrued Liability Reconciliation**

1. June 30, 2015 Unfunded Actuarial Accrued Liability	\$	597,117,866
2. Normal Cost for 2015 Plan Year <sup>1</sup>		161,391,660
3. Actuarially Determined Contribution (Employer + Member) <sup>1</sup>		199,466,710
4. Interest of 8.00% on (1) + (2) - (3) <sup>2</sup>		46,305,004
5. Expected June 30, 2016 Unfunded Actuarial Accrued Liability (1) + (2) - (3) + (4)	\$	605,347,820
6. Actuarial Value of Assets Experience (Gain)/Loss <sup>3</sup>	\$	40,418,536
7. Actuarial Accrued Liability Experience (Gain)/Loss		
a. Actuarial Accrued Liability Experience	\$	(28,581,239)
b. Additional Liability Due to Cost-of-living Adjustments <sup>4</sup>		(30,366,429)
c. Additional Liability Due to Changes in Actuarial Assumptions <sup>5</sup>		65,420,724
d. Additional Liability Due to Changes in Plan Provisions		-
8. Total Experience (Gain)/Loss - New Amortization Base (6) + (7)(a) + (7)(b) + (7)(c) + (7)(d)	\$	46,891,592
9. Actual June 30, 2016 Unfunded Actuarial Accrued Liability (5) + (8)	\$	652,239,412

<sup>1</sup> Mid-year.

<sup>2</sup> Includes adjustment due to changes from mid-year to beginning-of-year and from simple to compound interest.

<sup>3</sup> Includes the impact of contributions made in excess of the Actuarially Determined Contribution.

<sup>4</sup> A Cost-of-Living Adjustment (COLA) of 0.00% is effective January 1, 2017, rather than the assumed increase of 2.00%.

<sup>5</sup> Several assumptions were updated pursuant to an experience study completed in June 2016. See Section V for a detailed list of the assumption changes made for the June 30, 2016 valuation.

SECTION II - FUNDING

**D. Reconciliation of Actuarial Accrued Liability**

1.	June 30, 2015 Actuarial Accrued Liability	\$	4,512,316,979
2.	Normal Cost for 2015 Plan Year <sup>1</sup>		161,391,660
3.	Actual Benefit Payments <sup>2</sup>		250,390,477
4.	Transfers, Purchases, and Reinstatements <sup>3</sup>		7,690,111
5.	Interest of 8.00% on (1) + (2) - (3) + (4) <sup>4</sup>		372,184,628
6.	Expected June 30, 2016 Actuarial Accrued Liability:	\$	4,803,192,901
	(1) + (2) - (3) + (4) + (5)		

			<u>Dollar Change in Liability</u>	<u>Percent Change in Liability</u>
7.	(Gain)/Loss Components			
a.	Census and Experience Other Than Salary Experience	\$	(498,993)	0.0%
b.	Salary Experience		(28,082,246)	(0.6%)
c.	Cost-of-Living Adjustment <sup>5</sup>		(30,366,429)	(0.6%)
d.	Assumption Changes <sup>6</sup>		65,420,724	1.3%
e.	Plan Provision Changes		-	0.0%
f.	Total: (7)(a) + (7)(b) + (7)(c) + (7)(d) + (7)(e)	\$	6,473,056	0.1%
8.	Actual June 30, 2016 Actuarial Accrued Liability: (6) + (7)(f)	<b>\$</b>	<b>4,809,665,957</b>	

<sup>1</sup> Mid-year.

<sup>2</sup> Includes refunds of accumulated member contributions.

<sup>3</sup> Includes \$62,383 of employer reciprocity and RSMo 169.655 transfers and \$7,627,728 of member service purchases and reinstatements.

<sup>4</sup> Includes adjustment due to changes from mid-year to beginning-of-year and from simple to compound interest.

<sup>5</sup> A Cost-of-Living Adjustment (COLA) of 0.00% is effective January 1, 2017, rather than the assumed increase of 2.00%.

<sup>6</sup> Several assumptions were updated pursuant to an experience study completed in June 2016. See Section V for a detailed list of the assumption changes made for the June 30, 2016 valuation.

SECTION II - FUNDING

**E. Reconciliation of Market Value of Assets**

	<b>June 30, 2015</b>	<b>June 30, 2016</b>
1. Market Value of Assets, Prior June 30	\$ 3,846,322,885	\$ 3,983,410,820
2. Operating Revenues (Receipts)		
a. Employer Contributions	\$ 103,624,310	\$ 106,717,021 <sup>1</sup>
b. Member Contributions	110,443,660	114,257,497 <sup>2</sup>
c. Interest	20,036,285	20,041,736
d. Dividends	18,699,592	20,567,094
e. Net Income from Security Lending Activities	402,754	10,556,653
f. Net Capital Appreciation/(Depreciation)	169,311,476	44,363,920
g. Investment Expenses	(44,732,485)	\$ (35,212,118)
h. Other Income	2,075	104
i. Total Receipts:	\$ 377,787,667	\$ 281,291,907
(2)(a) + (2)(b) + (2)(c) + (2)(d) + (2)(e) + (2)(f) + (2)(g) + (2)(h)		
3. Operating Expenses (Disbursements)		
a. Benefit Payments	\$ 215,242,490	\$ 230,685,685
b. Refunds to Members	19,827,691	19,704,792
c. Administrative Expenses	5,629,203	6,981,527 <sup>3</sup>
d. Other Expenses	348	50
e. Total Disbursements:	\$ 240,699,732	\$ 257,372,054
(3)(a) + (3)(b) + (3)(c) + (3)(d)		
4. Excess of Revenues over Expenses: (2)(i) - (3)(e)	\$ 137,087,935	\$ 23,919,853
5. Market Value of Assets, Current June 30: (1) + (4)	<b>\$ 3,983,410,820</b>	<b>\$ 4,007,330,673</b>

<sup>1</sup> Includes \$62,383 of reciprocity and RSMo 169.655 transfers and \$222,127 of contributions for system employees other than investment staff.

<sup>2</sup> Includes \$7,627,728 of member service purchases and reinstatements.

<sup>3</sup> Includes \$222,127 of contributions for system employees other than investment staff.

SECTION II - FUNDING

**F. Development of Actuarial Value of Assets**

1.	Actuarial Value of Assets June 30, 2015		\$ 3,915,199,113
2.	Activity for Fiscal Year 2016		
	a. Contributions <sup>1</sup>		\$ 220,974,518
	b. Benefit Payments <sup>2</sup>		<u>(250,390,477)</u>
	c. Net Cash Flow		\$ (29,415,959)
3.	Expected Returns <sup>3</sup>		\$ 312,061,927
4.	Assets Before Allocation of Gain/Loss: (1) + (2) + (3)		\$ 4,197,845,081
5.	Actual Returns for 2016 (Net of Expenses)		\$ 53,335,812
6.	Excess Returns for 2016: (5) - (3)		\$ (258,726,115)
7.	Recognized Excess Returns:		
	<u>Year</u>	<u>Excess Return</u>	<u>% Unrecognized</u>
	2016	(258,726,115)	80%
	2015	(127,847,304)	60%
	2014	280,718,719	40%
	2013	106,529,578	20%
	2012	(202,767,564)	0%
	Total		<u>\$ (40,418,536)</u>
8.	Actuarial Value of Assets, June 30, 2016: (4) + (7)		<b>\$ 4,157,426,545</b>

<sup>1</sup> Includes \$62,383 of reciprocity and RSMo 169.655 transfers and \$7,627,728 of member service purchases and reinstatements.

<sup>2</sup> Includes refunds of accumulated member contributions.

<sup>3</sup> Assumes cash flows occur at mid-year.

SECTION II - FUNDING

G. Contribution Rate

<b>Development of Actuarially Determined Contribution Rate:</b>	<u>June 30, 2015</u>	<u>June 30, 2016</u>
1. Anticipated Payroll	\$ 1,469,771,528	\$ 1,519,081,146
2. Normal Cost <sup>1</sup>		
a. Amount	\$ 161,391,660	\$ 150,975,958
b. Percentage of Payroll	10.98%	9.94%
3. Unfunded Actuarial Accrued Liability (UAAL) Amortization <sup>2</sup>		
a. Amount	\$ 38,075,050	\$ 41,637,462
b. Percentage of Payroll	2.59%	2.74%
4. Actuarially Determined Contribution Rate		
a. Percentage of Payroll: (2)(b) + (3)(b)	<b>13.57%</b>	<b>12.68%</b>
b. Effective UAAL Amortization Period	25.6 Years	24.9 Years
5. Recommended Total Contribution Rate, Member + Employer		
a. Percentage of Payroll	<b>13.72%</b>	<b>13.72%</b>
b. Effective UAAL Amortization Period	23.2 Years	15.1 Years
c. Effective Date	July 1, 2016	July 1, 2017

<sup>1</sup> The Normal Cost shown for years prior to June 30, 2016 is mid-year and includes a 1.50% load for anticipated losses on service purchases. The Normal Cost shown for June 30, 2016 is as of the beginning of the year and includes a 1.50% load for anticipated losses on service purchases. As a suggestion noted in the 2016 actuarial audit, this methodology was refined for June 30, 2016 and approved by PEERS.

<sup>2</sup> The Unfunded Actuarial Accrued Liability (UAAL) Amortization shown for years prior to June 30, 2016 is mid-year. The UAAL Amortization for June 30, 2016 is as of the beginning of the year. As a suggestion noted in the 2016 actuarial audit, this methodology was refined for June 30, 2016 and approved by PEERS.

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SECTION II - FUNDING

**H. Determination of the Normal Cost Rate**

	<u>Dollar <sup>1</sup></u>	<u>Rate</u>
1. Active Members		
a. Retirement Benefits	\$ 109,119,431	7.18%
b. Termination Benefits	38,661,017	2.55%
c. Death and Disability Benefits	<u>3,195,510</u>	<u>0.21%</u>
e. Total Normal Cost	\$ 150,975,958	9.94%
2. Anticipated Member Payroll	\$ 1,519,081,146	

<sup>1</sup> Normal cost amounts include a 1.50% load for anticipated losses on service purchases.

SECTION II - FUNDING

**I. Determination of the Unfunded Actuarial Accrued Liability Amortization Rate**

	<u>Date Base Established</u>	<u>Reason</u>	<u>Remaining Balance <sup>1</sup></u>	<u>Remaining Period</u>	<u>Amortization Amount</u>	<u>Rate</u>
1.	6/30/2007	Plan Amendment	\$ 1,036,207	11	\$ 115,543	0.01%
2.	6/30/2011	UAAL Fresh Start	563,090,499	25	\$ 35,859,694	2.36%
3.	6/30/2012	Actuarial Experience	134,604,459	26	\$ 8,388,238	0.55%
4.	6/30/2013	Plan Amendment <sup>2</sup>	1,740,596	17	\$ 140,937	0.01%
5.	6/30/2013	Actuarial Experience	65,742,710	27	\$ 4,014,420	0.27%
6.	6/30/2014	Actuarial Experience	(120,727,799)	28	\$ (7,232,372)	-0.48%
7.	6/30/2015	Actuarial Experience	(40,138,852)	29	\$ (2,361,727)	-0.16%
8.	6/30/2016	Actuarial Experience and Assumption Changes	<u>46,891,592</u>	30	<u>\$ 2,712,729</u>	<u>0.18%</u>
	Total		\$ 652,239,412		\$ 41,637,462	2.74%
9.	Anticipated Member Payroll				\$ 1,519,081,146	

<sup>1</sup> Amortized as a level percent of payroll assuming 3.25% payroll growth and 7.75% discount rate.

<sup>2</sup> Permanent extension of the Special Early Retirement ("25-and-out") benefit. This Plan Amendment is being amortized over 20 years in accordance with RSMo 105.684.2.

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SECTION II - FUNDING

**J. History of Contribution Rates**<sup>1</sup>

<u>Valuation Date</u>	<u>Effective Date</u>	<u>Total Contribution Rate</u>
June 30, 2001	July 1, 2002	10.00%
June 30, 2002	July 1, 2003	10.00%
June 30, 2003	July 1, 2004	10.50%
June 30, 2004	July 1, 2005	11.00%
June 30, 2005	July 1, 2006	11.50%
June 30, 2006	July 1, 2007	12.00%
June 30, 2007	July 1, 2008	12.50%
June 30, 2008	July 1, 2009	13.00%
June 30, 2009	July 1, 2010	13.26%
June 30, 2010	July 1, 2011	13.72%
June 30, 2011	July 1, 2012	13.72%
June 30, 2012	July 1, 2013	13.72%
June 30, 2013	July 1, 2014	13.72%
June 30, 2014	July 1, 2015	13.72%
June 30, 2015	July 1, 2016	13.72%

<sup>1</sup> Valuation results prior to June 30, 2009 were calculated by the prior actuary.



SECTION II - FUNDING

**K. Historical Investment Experience**

<u>Year Ending June 30</u>	<u>Rate of Investment Return</u>		<u>Actuarial Assumed</u>
	<u>Market Basis <sup>1</sup></u>	<u>Actuarial Basis <sup>2,3</sup></u>	<u>Interest Rate</u>
2007	16.4%	10.9%	8.00%
2008	(4.4%)	7.9%	8.00%
2009	(18.9%)	2.0%	8.00%
2010	12.5%	2.5%	8.00%
2011	21.2%	4.3%	8.00%
2012	1.4%	1.9%	8.00%
2013	12.1%	4.8%	8.00%
2014	16.7%	11.4%	8.00%
2015	4.3%	9.8%	8.00%
2016	1.6%	7.0%	8.00%

<sup>1</sup> As provided by PEERS. Net of all expenses and fees.

<sup>2</sup> Approximate return net of all expenses and fees and assuming all cash flows occurred at mid-year.

<sup>3</sup> Valuation results prior to June 30, 2009 were calculated by the prior actuary.

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SECTION III - ACCOUNTING

**ACCOUNTING**

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SECTION III - ACCOUNTING

**PLAN FINANCIAL STATEMENTS UNDER GASB #67**

**A. Statement of Fiduciary Net Position under GASB #67 as of June 30, 2016**

1.	Assets		
	a. Cash	\$	13,096,817
	b. Receivables		
	i. Contributions Receivable	\$	23,388,247
	ii. Accrued Interest and Dividends		7,417,614
	iii. Investment Sales		171,475,885
	iv. Due from PSRS		-
	v. Other		1,838
	vi. Total Receivables	\$	202,283,584
	c. Total Investments		
	i. Short-Term Investments	\$	60,241,824
	ii. US Treasuries and TIPS		688,812,201
	iii. US Public Equities		1,262,667,756
	iv. Global Public Equities		601,719,203
	v. Public Debt		242,744,635
	vi. Private Equity		318,934,735
	vii. Private Credit		26,195,585
	viii. Private Real Estate		315,237,152
	ix. Hedged Assets		504,128,054
	x. Total Investments	\$	4,020,681,145
	d. Invested Securities Lending Collateral		42,658,214
	e. Prepaid Expenses		-
	f. Fixed Assets, Net of Depreciation		-
	g. Total Assets: (1)(a) + (1)(b)(vi) + (1)(c)(x) + (1)(d) + (1)(e) + (1)(f)	\$	4,278,719,760
2.	Liabilities		
	a. Accounts Payable	\$	1,499,741
	b. Interest Payable		17,900
	c. Securities Lending Collateral		42,658,315
	d. Investment Purchases		224,581,857
	e. Due to PSRS		994,704
	f. Lease Liability		-
	g. Accrued Medical Claims <sup>1</sup>		98,800
	h. OPEB Liability for System Employees <sup>1</sup>		743,305
	i. Compensated Absences <sup>1</sup>		794,465
	j. Total Liabilities: (2)(a) + (2)(b) + (2)(c) + (2)(d) + (2)(e) + (2)(f) + (2)(g) + (2)(h) + (2)(i)	\$	271,389,087
3.	Fiduciary Net Position Restricted for Pensions: (1)(g) - (2)(j)	<b>\$</b>	<b>4,007,330,673</b>

<sup>1</sup> Compensation and benefit costs related to System employees and paid from the Trust.

SECTION III - ACCOUNTING

**PLAN FINANCIAL STATEMENTS UNDER GASB #67**

**B. Statement of Changes in Fiduciary Net Position under GASB #67 for the Year Ended June 30, 2016**

1. Fiduciary Net Position as of June 30, 2015	\$	3,983,410,820
2. Additions		
a. Contributions		
i. Member Contributions <sup>1</sup>	\$	114,257,497
ii. Employer Contributions <sup>2</sup>		106,717,021
iii. Non-Employer Contributing Entity Contributions		-
iv. Total Contributions	\$	220,974,518
b. Investment Income/(Loss)		
i. Net Appreciation/(Depreciation)	\$	44,363,920
ii. Net Interest and Dividend Income		40,608,830
iii. Net Income from Security Lending Activities		10,556,653
iv. Other Net Investment Income		-
v. Investment Expenses and Rebates		(35,212,118)
vi. Total Investment Income/(Loss)	\$	60,317,285
c. Other Additions		
i. PEERS Capital Asset Change	\$	-
ii. Miscellaneous Income		104
iii. Total Other Additions	\$	104
d. Total Revenue (Additions): (2)(a)(iv) + (2)(b)(vi) + (2)(c)(iii)	\$	281,291,907
3. Deductions		
a. Monthly Benefits	\$	230,685,685
b. Refunds of Contributions		19,704,792
c. Administrative Expenses <sup>3</sup>		6,981,527
d. Other Expenses		50
e. Total Expenses (Deductions): (3)(a) + (3)(b) + (3)(c) + (3)(d)	\$	257,372,054
4. Net Increase (Decrease) in Fiduciary Net Position: (2)(d) - (3)(e)	\$	23,919,853
5. Fiduciary Net Position as of June 30, 2016: (1) + (4)	<b>\$</b>	<b>4,007,330,673</b>

<sup>1</sup> Includes \$7,627,728 of contributions for service purchases and reinstatements.

<sup>2</sup> Includes \$62,383 of contributions for reciprocity and RSMo 169.655 transfers and \$222,127 of contributions for system employees other than investment staff.

<sup>3</sup> Includes \$222,127 of contributions for system employees other than investment staff.

SECTION III - ACCOUNTING

**EMPLOYER FINANCIAL STATEMENTS UNDER GASB #68**

**C. Net Pension Liability under GASB #68 for the Year Ended June 30, 2016**

1.	Total Pension Liability		
	a. Total Pension Liability - Beginning of year	\$	4,512,316,979
	b. Total service cost <sup>1</sup>		161,391,660
	c. Interest cost <sup>2</sup>		372,184,628
	d. Experience (gains)/losses		(58,947,668)
	e. Assumption changes		65,420,724
	f. Plan amendments		-
	g. Benefit payments <sup>3</sup>		(250,390,477)
	h. Transfers, Purchases, and Reinstatements		<u>7,690,111</u>
	i. Total Pension Liability - End of year	\$	4,809,665,957
2.	Plan Fiduciary Net Position		
	a. Plan Fiduciary Net Position - Beginning of year	\$	3,983,410,820
	b. Employer contributions <sup>4</sup>		106,717,021
	c. Member contributions <sup>5</sup>		114,257,497
	d. Non-employer contributing entity contributions		-
	e. Investment return		
	i. Expected investment return <sup>2,6</sup>	\$	317,518,863
	ii. Investment gain/(loss)		<u>(257,201,474)</u>
	iii. Net investment return		60,317,389
	f. Benefit payments <sup>3</sup>		(250,390,477)
	g. Administrative and Other Expenses <sup>7</sup>		<u>(6,981,577)</u>
	h. Plan Fiduciary Net Position - End of year:	\$	4,007,330,673
3.	Net Pension Liability		
	a. Net Pension Liability: (1)(i) - (2)(h)	<b>\$</b>	<b>802,335,284</b>
	b. Plan Fiduciary Net Position as a Percentage of the Total Pension Liability : (2)(h) / (1)(i)		83.3%

<sup>1</sup> Mid-year.

<sup>2</sup> Reflects actual benefit payments and includes adjustment due to changes from mid-year to beginning-of-year and from simple to compound interest.

<sup>3</sup> Includes refunds of accumulated member contributions.

<sup>4</sup> Includes \$62,383 of contributions for reciprocity and RSMo 169.655 transfers and \$222,127 of contributions for system employees other than investment staff.

<sup>5</sup> Includes \$7,627,728 of contributions for service purchases and reinstatements.

<sup>6</sup> 8.00%, net of investment expenses and assuming cash flows occur at mid-year.

<sup>7</sup> Includes \$222,127 of contributions for system employees other than investment staff.

SECTION III - ACCOUNTING

**EMPLOYER FINANCIAL STATEMENTS UNDER GASB #68**

**D. Deferred Inflows and Outflows of Resources under GASB #68 for the Year Ended June 30, 2016 <sup>1</sup>**

<u>Fiscal Year Established</u>	<u>Reason</u>	<u>Remaining Balance At Beginning of Year</u>	<u>Remaining Period <sup>2</sup></u>	<u>Annual Recognition</u>	<u>Remaining Balance At End of Year</u>
1. Liability experience					
a. Inflows					
2014	Experience gain	\$ 7,413,032	2.15	\$ 3,447,922	\$ 3,965,110
2016	Experience gain	\$ 58,947,668	3.71	\$ 15,888,860	\$ 43,058,808
b. Outflows					
2015	Experience loss	\$ (34,283,618)	3.10	\$ (11,059,232)	\$ (23,224,386)
2. Assumption changes					
a. Inflows					
None					
b. Outflows					
2016	Assumption Loss	\$ (65,420,724)	3.71	\$ (17,633,619)	\$ (47,787,105)
3. Investment experience <sup>3</sup>					
a. Inflows					
2014	Investment gain	\$ 163,128,960	3.00	\$ 54,376,320	\$ 108,752,640
b. Outflows					
2015	Investment loss	\$ (114,516,972)	4.00	\$ (28,629,244)	\$ (85,887,728)
2016	Investment loss	\$ (257,201,474)	5.00	\$ (51,440,295)	\$ (205,761,179)
4. Total deferred inflows / outflows: (1) + (2) + (3)					
a. Inflows					
	Total	<b>\$ 229,489,660</b>		<b>\$ 73,713,102</b>	<b>\$ 155,776,558</b>
b. Outflows					
	Total	<b>\$ (471,422,788)</b>		<b>\$ (108,762,390)</b>	<b>\$ (362,660,398)</b>

<sup>1</sup> As allowable under GASB #68, information was prepared prospectively from June 30, 2013.

<sup>2</sup> The initial amortization period for liability experience gains / losses and assumption change gains / losses is equal to the expected future working lifetime of all members, active and inactive. The initial amortization period for investment gains / losses is five years.

<sup>3</sup> Net of investment expenses.

SECTION III - ACCOUNTING

**EMPLOYER FINANCIAL STATEMENTS UNDER GASB #68**

**D. Deferred Inflows and Outflows of Resources under GASB #68 for the Year Ended June 30, 2016 (Continued)**

Amounts reported as collective deferred inflows / (outflows) of resources to be recognized in pension expense:

Year Ending June 30:

2017	\$	(35,049,288)
2018	\$	(37,980,022)
2019	\$	(82,414,236)
2020	\$	(51,440,294)
2021	\$	-
Thereafter	\$	-

SECTION III - ACCOUNTING

**EMPLOYER FINANCIAL STATEMENTS UNDER GASB #68**

**E. Pension Expense under GASB #68 for the Year Ended June 30, 2016**

1. Service cost	
a. Total service cost <sup>1</sup>	\$ 161,391,660
b. Member contributions <sup>2</sup>	(106,629,769)
c. Administrative and other expenses <sup>3</sup>	<u>6,759,400</u>
d. Net employer service cost	\$ 61,521,291
2. Plan amendments	\$ -
3. Interest cost <sup>4</sup>	\$ 372,184,628
4. Expected return on assets	\$ (317,518,863)
5. Recognition of deferred (inflows) / outflows of resources related to:	
a. Liability experience (gains) / losses	\$ (8,277,550)
b. Assumption changes (gains) / losses	17,633,619
c. Investment (gains) / losses	<u>25,693,219</u>
d. Total: (5)(a) + (5)(b) + (5)(c)	\$ 35,049,288
6. Total collective pension expense: (1)(d) + (2) + (3) + (4) + (5)(d)	<b>\$ 151,236,344</b>

<sup>1</sup> Mid-year.

<sup>2</sup> Excludes \$7,627,728 of contributions for service purchases and reinstatements.

<sup>3</sup> Excludes \$222,127 of contributions for system employees other than investment staff.

<sup>4</sup> Includes adjustment due to changes from mid-year to beginning-of-year and from simple to compound interest.







SECTION III - ACCOUNTING

**REQUIRED SUPPLEMENTARY INFORMATION UNDER GASB #67 AND #68**

**G. Schedule of Changes in the Net Pension Liability and Plan Fiduciary Net Position under GASB #67 and #68** <sup>1</sup>

Year Ending June 30:	<u>2014</u>	<u>2015</u>	<u>2016</u>
1. Total Pension Liability			
a. Total Pension Liability - Beginning of year	\$ 3,967,618,752	\$ 4,211,488,832	\$ 4,512,316,979
b. Total service cost <sup>2</sup>	159,672,364	156,599,641	161,391,660
c. Interest cost <sup>3</sup>	315,131,402	333,780,285	372,184,628
d. Experience (gains)/losses	(14,308,876)	45,342,850	(58,947,668)
e. Assumption changes	-	-	65,420,724
f. Plan amendments	-	-	-
g. Benefit payments <sup>4</sup>	(216,624,810)	(235,070,181)	(250,390,477)
h. Transfers, Purchases, and Reinstatements	-	175,552	7,690,111
i. Total Pension Liability - End of year:	<u>\$ 4,211,488,832</u>	<u>\$ 4,512,316,979</u>	<u>\$ 4,809,665,957</u>
2. Plan Fiduciary Net Position			
a. Plan Fiduciary Net Position - Beginning of year	\$ 3,316,512,798	\$ 3,846,322,885	\$ 3,983,410,820
b. Employer contributions <sup>5</sup>	100,699,735	103,624,310	106,717,021
c. Member contributions <sup>6</sup>	106,420,656	110,443,660	114,257,497
d. Non-employer contributing entity contributions	-	-	-
e. Net investment return	544,154,941	163,719,697	60,317,389
f. Benefit payments <sup>4</sup>	(216,624,810)	(235,070,181)	(250,390,477)
g. Administrative and Other Expenses <sup>7</sup>	(4,840,435)	(5,629,551)	(6,981,577)
h. Plan Fiduciary Net Position - End of year:	<u>\$ 3,846,322,885</u>	<u>\$ 3,983,410,820</u>	<u>\$ 4,007,330,673</u>

<sup>1</sup> As allowable under GASB #67 and GASB #68, information was prepared prospectively from June 30, 2013.

<sup>2</sup> Mid-year.

<sup>3</sup> Reflects actual benefit payments. Interest cost shown for 2016 includes an adjustment due to changes from mid-year to beginning-of-year and from simple to compound interest.

<sup>4</sup> Includes refunds of accumulated member contributions and other interfund transfers.

<sup>5</sup> Includes contributions for reciprocity and RSMo 169.655 transfers and contributions for system employees.

<sup>6</sup> Includes contributions for service purchases and reinstatements.

<sup>7</sup> Includes contributions for system employees.

SECTION III - ACCOUNTING

**REQUIRED SUPPLEMENTARY INFORMATION UNDER GASB #67 AND #68**

**H. Schedule of Net Pension Liability and Related Ratios under GASB #67 and #68**<sup>1</sup>

1. Year Ending	2. Total Pension Liability	3. Plan Fiduciary Net Position	4. Net Pension Liability (2) - (3)	5. Fiduciary Net Position as a Percentage of Total Pension Liability (3) / (2)	6. Anticipated Covered Employee Payroll <sup>2</sup>	7. Net Pension Liability as a Percentage of Covered Payroll (4) / (6)
6/30/2014	\$ 4,211,488,832	\$ 3,846,322,885	\$ 365,165,947	91.3%	\$ 1,442,700,979	25.3%
6/30/2015	\$ 4,512,316,979	\$ 3,983,410,820	\$ 528,906,159	88.3%	\$ 1,469,771,528	36.0%
6/30/2016	\$ 4,809,665,957	\$ 4,007,330,673	\$ 802,335,284	83.3%	\$ 1,519,081,146	52.8%

<sup>1</sup> As allowable under GASB #67 and GASB #68, information was prepared prospectively from June 30, 2013.

<sup>2</sup> Pensionable pay as provided by PEERS. Gross member compensation, which may include components of compensation not included in pensionable compensation was not made available to PwC.

SECTION III - ACCOUNTING

**REQUIRED SUPPLEMENTARY INFORMATION UNDER GASB #67 AND #68**

**I. Schedule of Contributions under GASB #67 and #68<sup>1</sup>**

1.  Year Ending	2.  Actuarially Determined Contribution <sup>1,2</sup>	3.  Actual Employer Contributions	4.  Contribution Excess / (Deficiency) (Deficiency)  (3) - (2)	5.  Actual Covered Member Payroll	6.  Contributions as a Percentage of Covered Payroll  (3) / (5)
6/30/2007	89,945,503	69,235,160	(20,710,343)	1,204,089,739	5.75%
6/30/2008	90,727,016	77,988,839	(12,738,177)	1,299,813,983	6.00%
6/30/2009	96,775,289	85,915,562	(10,859,727)	1,374,648,992	6.25%
6/30/2010	95,560,084	91,478,725	(4,081,359)	1,407,365,000	6.50%
6/30/2011	90,816,155	90,816,155	-	1,369,776,094	6.63%
6/30/2012	95,094,785	95,094,785	-	1,386,221,356	6.86%
6/30/2013	87,013,816	97,059,313	10,045,497	1,414,858,790	6.86%
6/30/2014	98,497,846	100,699,735	2,201,889	1,467,926,166	6.86%
6/30/2015	105,739,092	103,624,310	(2,114,782)	1,510,558,455	6.86%
6/30/2016	104,011,593 <sup>3</sup>	106,654,638 <sup>4</sup>	2,643,045	1,554,732,332	6.86%

<sup>1</sup> Valuation results prior to June 30, 2009 were computed by the prior actuary.

<sup>2</sup> Employer portion of the Actuarial Determined Contribution, net of member contributions.

<sup>3</sup> The actuarially determined contribution rate for employers for the year ending June 30, 2016 is 6.69%. This consists of an employer normal cost rate of 3.99%, which is net of the 6.86% contribution rate for members, and a UAAL amortization rate of 2.70%. Based on these percentages, the actuarial determined contribution amount for employers consists of \$62,033,820 for normal cost and \$41,977,773 for UAAL amortization.

<sup>4</sup> Excludes \$62,383 of contributions for reciprocity and RSMo 169.655 transfers.

SECTION III - ACCOUNTING

**REQUIRED SUPPLEMENTARY INFORMATION UNDER GASB #67 AND #68**

**J. Schedule of Money-Weighted Returns under GASB #67 and #68**<sup>1</sup>

1. Year Ending	2. Money-Weighted Rate of Return
6/30/2014	16.7%
6/30/2015	4.3%
6/30/2016	1.6%

<sup>1</sup> As allowable under GASB #67 and GASB #68, information was prepared prospectively from June 30, 2013.

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## SECTION IV - CENSUS DATA

### **CENSUS DATA**

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SECTION IV - CENSUS DATA

**A. Reconciliation of Member Counts**

	Actives <sup>1</sup>	Former Members <sup>2</sup>	Inactive Members <sup>3</sup>	Disabled Retirements	Service Retirements <sup>4</sup>	Beneficiary	Total
Total as of June 30, 2015	46,835	14,536	16,519	767	23,900	1,631	104,188
New Memberships	6,212	12	1,418	0	0	0	7,649
Terminated Members Reinstated	448	0	(448)	0	0	0	0
Refunds	(1,533)	(1,200)	(1,061)	0	0	0	(3,794)
Other Terminations	(2,394)	1,361	1,033	0	0	0	0
Service Retirements	(1,555)	0	(348)	0	1,903	0	0
Disabled Retirements	(34)	0	(19)	53	0	0	0
Death with Beneficiary	(15)	(18)	(1)	(17)	(141)	192	0
Death without Beneficiary	(41)	(108)	(17)	(14)	(605)	(90)	(875)
Voided memberships	(58)	(2)	(89)	(7)	0	0	(156)
Refund Pending	(9)	29	(20)	0	0	0	0
Data Adjustments	(5)	0	0	0	4	7	(1)
Total as of June 30, 2016	47,851	14,610	16,967	782	25,061	1,740	107,011

<sup>1</sup> The number of active members as of June 30, 2016 includes 972 members who retired in July 2016.

<sup>2</sup> Includes terminated and deceased former members whose contributions had yet to be distributed as of the valuation date.

<sup>3</sup> The number of inactive members as of June 30, 2016 includes 57 members who retired in July 2016.

<sup>4</sup> Includes members with benefits on hold that will be re-started at a future date.



SECTION IV - CENSUS DATA

**B. Member Census Statistics as of June 30, 2016**

	<u>Male</u>	<u>Female</u>	<u>Total</u>
1. Active			
Number <sup>1</sup>	12,560	35,291	47,851
Average Age	48.6	48.2	48.3
Average Years of Service	7.7	9.0	8.6
Anticipated Payroll of Actives <sup>2</sup>	\$ 473,141,297	\$ 1,045,939,849	\$ 1,519,081,146
2. Inactive			
Vested			
Number <sup>3</sup>	942	5,304	6,246
Annual Deferred Annuities	\$ 4,901,128	\$ 18,150,971	\$ 23,052,099
Non Vested			
Number <sup>4</sup>	2,951	7,770	10,721
Account Balance	\$ 6,136,480	\$ 14,090,881	\$ 20,227,362
Former Members Entitled to a Deferred Annuity			
Number	48	165	213
Annual Deferred Annuities	\$ 258,247	\$ 325,233	\$ 583,480
Former Members Entitled to a Refund of Contributions			
Number	5,253	9,144	14,397
Account Balance	\$ 3,578,104	\$ 9,248,968	\$ 12,827,071
3. Retiree/Beneficiary/Disabled			
Number <sup>5</sup>	6,757	20,826	27,583
Annual Benefits Payable <sup>6</sup>	\$ 64,803,722	\$ 164,201,693	\$ 229,005,415

<sup>1</sup> Includes 972 members who retired in July 2016.

<sup>2</sup> Figures shown are the anticipated pay for the one-year period following the valuation date; excludes 972 members who retired or became disabled in July 2016.

<sup>3</sup> Includes 57 members who retired in July 2016.

<sup>4</sup> Six (6) non vested inactive members missing gender are assumed to be female.

<sup>5</sup> Thirty nine (39) beneficiaries missing gender are assumed to be male.

<sup>6</sup> Does not include 1,029 members who retired in July 2016.

SECTION IV - CENSUS DATA

**C. History of Active Member Average Pay, Age, and Service**<sup>1</sup>

1. Valuation Date	2. Active Members	3. Covered Payroll (\$ in Thousands)	4. Average Pay (3) / (2)	5. Annual Percent Change	Average Attained Age	Average Years of Service
6/30/1997	35,982	556,534	15,467	-1.8%	45.1	7.1
6/30/1998	38,672	616,303	15,937	3.0%	44.8	6.7
6/30/1999	41,599	685,272	16,473	3.4%	44.6	6.5
6/30/2000	43,533	735,400	16,893	2.5%	44.5	6.4
6/30/2001	45,517	814,158	17,887	5.9%	44.6	6.3
6/30/2002	46,728	895,420	19,162	7.1%	44.8	6.4
6/30/2003	46,863	971,177	20,724	8.2%	45.3	6.6
6/30/2004	45,880	984,866	21,466	3.6%	46.2	7.0
6/30/2005	46,598	1,055,204	22,645	5.5%	46.6	7.1
6/30/2006	48,188	1,190,994	24,716	9.1%	46.4	7.1
6/30/2007	49,281	1,275,199	25,876	4.7%	46.6	7.2
6/30/2008	50,865	1,377,506	27,082	4.7%	46.8	7.3
6/30/2009	51,234	1,417,485	27,667	2.2%	47.1	7.5
6/30/2010	50,363	1,433,691	28,467	2.9%	47.5	8.0
6/30/2011	48,800	1,414,442	28,984	1.8%	47.9	8.3
6/30/2012	48,605	1,437,310	29,571	2.0%	48.1	8.4
6/30/2013	48,709	1,470,830	30,196	2.1%	48.1	8.5
6/30/2014	45,589	1,442,701	31,646	4.8%	48.6	8.9
6/30/2015	46,835	1,469,772	32,006	1.1%	48.4	8.7
6/30/2016	47,851 <sup>2</sup>	1,519,081 <sup>3</sup>	32,404 <sup>3</sup>	2.4%	48.3	8.6

<sup>1</sup> Valuation results prior to June 30, 2009 were computed by the prior actuary.

<sup>2</sup> Includes 972 members who retired in July 2016.

<sup>3</sup> Excludes pay for 972 members who retired in July 2016.

SECTION IV - CENSUS DATA

**D. Distribution of Active Members by Salary**<sup>1</sup>

Salary	Number	Percent
Under \$5,000	783	1.67%
\$5,000 - 9,999	2,073	4.42%
\$10,000 - 14,999	3,318	7.08%
\$15,000 - 19,999	5,240	11.18%
\$20,000 - 24,999	7,117	15.18%
\$25,000 - 29,999	7,031	15.00%
\$30,000 - 34,999	5,409	11.54%
\$35,000 - 39,999	4,299	9.17%
\$40,000 - 44,999	3,431	7.32%
\$45,000 - 49,999	2,583	5.51%
\$50,000 - 54,999	1,775	3.79%
\$55,000 - 59,999	1,120	2.39%
\$60,000 - 64,999	776	1.66%
\$65,000 - 69,999	518	1.10%
\$70,000 - 74,000	369	0.79%
\$75,000 & Over	1,037	2.21%
Total	46,879	100.00%

<sup>1</sup> Excludes 972 members who retired in July 2016.

SECTION IV - CENSUS DATA

**E. Distribution of Active Members by Age and Service** <sup>1</sup>

<b>Attained Age</b>	Distribution of Active Members by Age and Service as of June 30, 2016							Total
	0 to 4 years	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	Over 30	
<25	1,451	8						1,459
25-29	2,588	300	8					2,896
30-34	2,369	835	205	5				3,414
35-39	2,537	1,007	514	199	6			4,263
40-44	2,478	1,240	731	393	77	4		4,923
45-49	2,410	1,643	1,229	696	196	94	2	6,270
50-54	2,207	1,706	1,573	1,352	491	216	73	7,618
55-59	1,925	1,637	1,594	1,573	913	273	130	8,045
60-64	1,342	1,204	999	1,080	654	317	148	5,744
≥65	872	749	620	428	249	153	148	3,219
Total	20,179	10,329	7,473	5,726	2,586	1,057	501	47,851

<sup>1</sup> Includes 972 members who retired in July 2016.

SECTION IV - CENSUS DATA

**F. Distribution of Inactive Members by Age and Service**<sup>1</sup>

<b>Attained Age</b>	Distribution of Inactive Members by Age and Service as of June 30, 2016							Total
	0 to 4 years	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	Over 30	
<25	953	1						954
25-29	2,548	39						2,587
30-34	1,732	257	7					1,996
35-39	1,241	403	70	11				1,725
40-44	1,128	475	99	14	1			1,717
45-49	1,090	703	211	39	8			2,051
50-54	906	947	357	112	25	3		2,350
55-59	668	1,035	457	149	20			2,329
60-64	389	339	104	34	4		1	871
≥65	279	80	16	10	1	1		387
Total	10,934	4,279	1,321	369	59	4	1	16,967

<sup>1</sup> Includes 57 members who retired in July 2016.

SECTION IV - CENSUS DATA

**G. Distribution of Retired Members, Beneficiaries, and Disabled Members by Age and Number of Years Retired**

<b>Attained Age</b>	Distribution of Retired Members, Beneficiaries, and Disabled Members by Age and Number of Years Retired as of June 30, 2016							
	0 to 4 years	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	Over 30	Total
<50	90	32	22	6	3	2	2	157
50-54	205	47	25	7	4	1		289
55-59	973	227	61	19	8	2	3	1,293
60-64	3,120	759	126	34	8	7	5	4,059
65-69	3,058	2,400	675	82	9	7	7	6,238
70-74	1,297	2,071	1,676	443	33	6	5	5,531
75- 79	459	788	1,494	1,271	268	14	2	4,296
80-84	119	266	429	1,123	788	129	10	2,864
85-89	35	96	147	286	705	484	23	1,776
≥90	7	13	40	72	179	432	337	1,080
<b>Total</b>	<b>9,363</b>	<b>6,699</b>	<b>4,695</b>	<b>3,343</b>	<b>2,005</b>	<b>1,084</b>	<b>394</b>	<b>27,583</b>

<sup>1</sup> Does not include 1,029 members who retired in July 2016.

SECTION IV - CENSUS DATA

**H. History of Retirees, Beneficiaries, and Disabled Members**<sup>1,2</sup>

Valuation Date	Service Retirees			Disability Retirees			Beneficiaries		
	Added	Removed	End of Year	Added	Removed	End of Year	Added	Removed	End of Year
6/30/1996	799	390	10,376	26	8	267	47	18	415
6/30/1997	823	388	10,811	22	13	276	63	18	460
6/30/1998	841	424	11,218	29	17	288	59	22	497
6/30/1999	813	431	11,600	35	7	316	67	19	545
6/30/2000	945	432	12,113	45	14	347	76	20	601
6/30/2001	987	468	12,632	53	22	378	76	14	663
6/30/2002	980	471	13,141	30	21	387	97	18	742
6/30/2003	979	501	13,619	31	13	405	96	25	813
6/30/2004	1,081	541	14,159	44	18	431	86	44	855
6/30/2005	1,116	505	14,770	43	26	448	98	29	924
6/30/2006	1,080	528	15,322	53	23	478	86	50	960
6/30/2007	1,250	563	16,009	29	18	489	120	39	1,041
6/30/2008	1,256	569	16,696	46	21	514	99	62	1,078
6/30/2009	1,439	578	17,557	45	18	541	113	41	1,150
6/30/2010	1,471	670	18,358	51	15	577	140	67	1,223
6/30/2011	1,681	595	19,444	74	31	620	114	73	1,264
6/30/2012	1,680	587	20,537	65	17	668	152	59	1,357
6/30/2013	1,656	674	21,519	68	27	709	164	75	1,446
6/30/2014	1,886	649	22,756	59	33	735	156	64	1,538
6/30/2015	1,866	722	23,900	57	25	767	159	66	1,631
6/30/2016	1,907	746	25,061	53	38	782	199	90	1,740

<sup>1</sup> Does not include 1,029 members who retired or became disabled in July 2016.

<sup>2</sup> Valuation results prior to June 30, 2009 were computed by the prior actuary.

SECTION IV - CENSUS DATA

**I. History of Cost of Living Increases to Retired Members**

Retirement In	Effective Date of First COLA	First COLA Percentage Increase	Total Increases Through January 2016 <sup>1</sup>	January 2017 Increase Based on Proposal	Total Increases Through January 2017 <sup>1</sup>	Number of Retired Members at 6/30/2016 <sup>2</sup>
1988 & Earlier	Various	Various	80.00%	0.00%	80.00%	673
1989	Jan. 1993	3.10%	77.82%	0.00%	77.82%	209
1990	Jan. 1994	3.00%	72.49%	0.00%	72.49%	263
1991	Jan. 1995	2.50%	67.46%	0.00%	67.46%	272
1992	Jan. 1996	3.00%	63.37%	0.00%	63.37%	325
1993	Jan. 1997	2.80%	58.61%	0.00%	58.61%	330
1994	Jan. 1998	2.30%	54.28%	0.00%	54.28%	383
1995	Jan. 1999	1.70%	50.81%	0.00%	50.81%	447
1996	Jan. 2000	2.00%	48.28%	0.00%	48.28%	507
1997	Jan. 2001	3.70%	45.38%	0.00%	45.38%	573
1998	Jan. 2002	3.30%	40.20%	0.00%	40.20%	564
1999	Jan. 2003	1.10%	35.73%	0.00%	35.73%	664
2000	Jan. 2004	2.10%	34.24%	0.00%	34.24%	747
2001	Jan. 2005	3.30%	31.48%	0.00%	31.48%	727
2002	Jan. 2006	2.50%	27.30%	0.00%	27.30%	780
2003	Jan. 2007	4.30%	24.19%	0.00%	24.19%	872
2004	Jan. 2008	2.70%	19.06%	0.00%	19.06%	903
2005	Jan. 2009	5.00%	15.92%	0.00%	15.92%	955
2006	Jan. 2010	0.00%	10.40%	0.00%	10.40%	999
2007	Jan. 2011	0.00%	10.40%	0.00%	10.40%	1,153
2008	Jan. 2012	2.00%	10.40%	0.00%	10.40%	1,165
2009	Jan. 2013	2.00%	8.24%	0.00%	8.24%	1,250
2010	Jan. 2014	2.00%	6.12%	0.00%	6.12%	1,633
2011	Jan. 2015	2.00%	4.04%	0.00%	4.04%	1,660
2012	Jan. 2016	2.00%	2.00%	0.00%	2.00%	1,612
2013	Jan. 2017	0.0%		0.00%	0.00%	1,819
2014						1,898
2015						1,935
2016						525
<b>Total</b>						<b>25,843</b>

<sup>1</sup> Cumulative lifetime COLA increases are limited to 80%.

<sup>2</sup> Includes Service Retirees and Disabled Retirees as of June 30, 2016; Does not include 1,029 members who retired in July 2016.



SECTION IV - CENSUS DATA

**J. Distribution of Retired Members by Type and Monthly Amount <sup>1</sup>**

<u>Monthly</u>	<u>Service</u>	<u>Disability</u>	<u>Beneficiary</u>	<u>Total</u>
Less than \$100	1,268	23	154	1,445
\$100-199	3,799	127	351	4,277
\$200-299	3,454	141	287	3,882
\$300-399	2,647	142	212	3,001
\$400-499	2,087	91	167	2,345
\$500-999	6,101	214	388	6,703
\$1,000-1,499	2,939	39	107	3,085
\$1,500 & Over	2,766	5	74	2,845
Total	25,061	782	1,740	27,583

<sup>1</sup> Does not include 1,029 members who retired in July 2016.

SECTION IV - CENSUS DATA

**K. Distribution of Retired Members by Type of Benefit**<sup>1</sup>

<u>Type of Benefit</u>	<u>Number</u>	<u>Annual Benefit</u>
Service Retirees		
Options 1 & 10 (Life Only)	17,340	\$ 134,738,508
Options 2 & 21 (100% J&S with Pop-Up)	4,607	43,647,863
Options 3 & 31 (75% J&S with Pop-Up)	688	9,105,384
Options 4 & 41 (50% J&S with Pop-Up)	1,144	15,719,632
Option 5 (10 Years Certain & Life)	901	6,350,147
Option 6 (5 Years Certain & Life)	269	2,244,573
Options 20 (100% J&S)	67	355,922
Options 30 (75% J&S)	1	4,276
Options 40 (50% J&S)	10	99,407
Accelerated Payment	34	518,629
<b>Total</b>	<b>25,061</b>	<b>\$ 212,784,341</b>
Disability Retirees	782	\$ 4,198,147
Beneficiaries	1,740	\$ 10,072,801

<sup>1</sup> Does not include 1,029 members who retired in July 2016.

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SECTION V - ACTUARIAL ASSUMPTIONS AND METHODS

**ACTUARIAL ASSUMPTIONS AND METHODS**

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SECTION V - ACTUARIAL ASSUMPTIONS AND METHODS

**A. Actuarial Assumptions**

The assumptions used in the valuation were selected and approved by the PEERS Board of Trustees. The demographic assumptions are reviewed every five years through a study of actual experience. The last study was completed in June 2016. In this way, the actuary provides guidance to the Board in selecting the assumptions. The actuary and other economic and investment professionals also provide advice for selecting the economic assumptions. In our opinion, the assumptions are reasonable for purposes of this valuation.

Inflation 2.25% per annum

Payroll Growth 3.25% per annum, consisting of 2.25% inflation, 0.50% real wage growth due to the inclusion of active health care costs in pensionable earnings, and 0.50% of real wage growth due to productivity.

Salary and Payroll Increases

Service	Inflation	Health Care Cost	Productivity	Merit, Promotion, Seniority	Individual Salary Growth
0	2.25%	0.50%	0.50%	7.75%	11.00%
1	2.25%	0.50%	0.50%	3.00%	6.25%
2	2.25%	0.50%	0.50%	2.50%	5.75%
3	2.25%	0.50%	0.50%	2.25%	5.50%
4	2.25%	0.50%	0.50%	2.00%	5.25%
5	2.25%	0.50%	0.50%	1.90%	5.15%
6	2.25%	0.50%	0.50%	1.80%	5.05%
7	2.25%	0.50%	0.50%	1.70%	4.95%
8	2.25%	0.50%	0.50%	1.60%	4.85%
9	2.25%	0.50%	0.50%	1.50%	4.75%
10	2.25%	0.50%	0.50%	1.40%	4.65%
11	2.25%	0.50%	0.50%	1.30%	4.55%
12	2.25%	0.50%	0.50%	1.20%	4.45%
13	2.25%	0.50%	0.50%	1.10%	4.35%
14	2.25%	0.50%	0.50%	1.00%	4.25%
15	2.25%	0.50%	0.50%	0.95%	4.20%
16	2.25%	0.50%	0.50%	0.90%	4.15%
17	2.25%	0.50%	0.50%	0.85%	4.10%
18	2.25%	0.50%	0.50%	0.80%	4.05%
19	2.25%	0.50%	0.50%	0.75%	4.00%
20+	2.25%	0.50%	0.50%	0.75%	4.00%

SECTION V - ACTUARIAL ASSUMPTIONS AND METHODS

**A. Actuarial Assumptions (Continued)**

Investment Returns

Funding: 7.75% per annum (net of investment and administrative expenses).  
Accounting: 7.75% per annum (net of investment expenses).

Cost of Living Adjustments

The cost of living adjustment (COLA) assumed in the valuation increases from 1.00% to 1.50% over ten years beginning January 1, 2018. The COLA reflected for July 1, 2017 is 0.00%, in accordance with the actual COLA approved by the Board. This COLA assumption is based on the current policy of the Board to grant a 0% COLA whenever annual inflation, as measured by the CPI-U index for a fiscal year, is less than 2%, 2% COLA whenever annual inflation is between 2% and 5%, and 5% whenever the annual inflation exceeds 5%.

The COLA assumption applies to service retirements and beneficiary annuities. The COLA does not apply to the benefits for in-service death payable to spouses (where the spouse is over age 60). Members begin receiving COLAs on the fourth January after benefit commencement. The total lifetime COLA cannot exceed 80% of the original benefit. Future COLAs for current benefit recipients reflect actual cumulative adjustments granted at the time of valuation.

Mortality Rates

Pre-Retirement: 75% of the RP-2006 Total Dataset Mortality Tables with static projection to 2028 using the 2014 SSA Improvement Scale. Illustrative rates per 1,000 members at various ages are as follows:

<u>Age</u>	<u>Male</u>	<u>Female</u>
20	0.279	0.114
30	0.325	0.146
40	0.399	0.265
50	1.214	0.789
60	2.751	1.429
70	8.672	4.156

SECTION V - ACTUARIAL ASSUMPTIONS AND METHODS

**A. Actuarial Assumptions (Continued)**

Mortality Rates (Continued):

Post-Retirement: RP-2006 Total Dataset Mortality Tables with plan specific experience adjustments and static projection to 2028 using the 2014 SSA Improvement Scale. The plan-specific experience adjustments as follows:

<u>Age</u>	<u>Males</u>	<u>Females</u>
<60	1.00	1.00
60-74	1.49	0.77
75-89	1.27	1.03
>=90	1.16	1.04

Illustrative rates per 1,000 members at various ages are as follows:

<u>Age</u>	<u>Male</u>	<u>Female</u>
40	0.532	0.353
50	3.904	2.642
60	9.060	3.119
70	20.854	8.702
80	50.476	33.375
90	153.099	113.293
100	347.456	278.540
110	514.345	442.593

Disabled Retirees: RP-2006 Disabled Retiree Mortality Tables with static projection to 2028 using the 2014 SSA Improvement Scale. Illustrative rates per 1,000 members at various ages are as follows:

<u>Age</u>	<u>Male</u>	<u>Female</u>
40	9.317	4.862
50	19.588	11.367
60	20.817	13.263
70	33.674	24.771
80	68.090	56.760
90	168.008	134.892
100	311.674	275.075
110	443.401	425.570

SECTION V - ACTUARIAL ASSUMPTIONS AND METHODS

**A. Actuarial Assumptions (Continued)**

Withdrawal Rates

Termination of membership prior to eligibility for retirement from all causes other than death, disability or retirement, whether resulting in a refund or a deferred benefit, is assumed in accordance with the following illustrative rates per 1,000 members:

<u>Years of Service</u>	<u>Rate</u>
0	350
1	230
2	180
3	150
4	125
5	100
10	55
15	33
20	18
25+	0

Disability Rates

Retirement for disability prior to age 60 is assumed in accordance with the following illustrative rates per 1,000 eligible members:

<u>Age</u>	<u>Male and Female Rates</u>
30	0.08
35	0.16
40	0.32
45	0.64
50	1.22
55	2.10

SECTION V - ACTUARIAL ASSUMPTIONS AND METHODS

**A. Actuarial Assumptions (Continued)**

Retirement Rates Retirement is assumed in accordance with the following rates per 1,000 eligible members:

Age	Service										
	<u>&lt;=20</u>	<u>21</u>	<u>22</u>	<u>23</u>	<u>24</u>	<u>25</u>	<u>26</u>	<u>27</u>	<u>28</u>	<u>29</u>	<u>&gt;=30</u>
<50	0	0	0	0	0	50	50	50	50	50	300
50	0	0	0	0	0	50	50	50	50	50	200
51	0	0	0	0	0	50	50	50	50	300	200
52	0	0	0	0	0	50	50	50	300	200	200
53	0	0	0	0	0	50	50	300	200	200	200
54	0	0	0	0	0	50	300	200	200	200	200
55	50	50	50	50	50	300	200	200	200	200	200
56	50	50	50	50	300	200	200	200	200	200	200
57	50	50	50	300	200	200	200	200	200	200	200
58	50	50	300	200	200	200	200	200	200	200	200
59	50	200	200	200	200	200	200	200	200	200	200
60	100	160	160	160	160	160	160	160	160	160	160
61	100	100	100	100	100	100	100	100	100	100	100
62	240	240	240	240	240	240	240	240	240	240	240
63	200	200	200	200	200	200	200	200	200	200	200
64	140	140	140	140	140	140	140	140	140	140	140
65	260	260	260	260	260	260	260	260	260	260	260
66	200	200	200	200	200	200	200	200	200	200	200
67	200	200	200	200	200	200	200	200	200	200	200
68	200	200	200	200	200	200	200	200	200	200	200
69	200	200	200	200	200	200	200	200	200	200	200
70	200	200	200	200	200	200	200	200	200	200	200
71	200	200	200	200	200	200	200	200	200	200	200
72	200	200	200	200	200	200	200	200	200	200	200
73	200	200	200	200	200	200	200	200	200	200	200
74	200	200	200	200	200	200	200	200	200	200	200
>=75	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000



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## SECTION V - ACTUARIAL ASSUMPTIONS AND METHODS

### **A. Actuarial Assumptions (Continued)**

Refund of Contributions	<p>For active members assumed to terminate employment with less than five years of service, regardless of age, 100% take an immediate refund of their contributions.</p> <p>For active members assumed to terminate employment with five or more years of service, but prior to satisfying the age and service requirements for service retirement, the member will select the option that has the greater present value between an immediate refund and a deferred annuity.</p> <p>For active members assumed to terminate employment with five or more years of service and satisfy the age and service requirements for service retirement upon termination, 100% are assumed to elect a lifetime annuity benefit.</p> <p>For inactive members, the member will select the option that has the greater present value between an immediate refund and a deferred annuity.</p>
Interest on Member Accounts	1.00% per annum.
Service Purchases	A 1.50% load is added to the Normal Cost to account for anticipated losses resulting from service purchases and reinstatements.
Provisions for Expenses	There is no specific provision for expenses. The implicit assumption for funding purposes is that investment and administrative expenses are paid from investment income in excess of 7.75% per annum. For accounting purposes the expected return is assumed to be net of investment expenses. Administrative expenses are included in the current year expense.
Dependent Assumptions (Pre-Retirement)	<p>70% of male and female members are assumed to be married.</p> <p>Beneficiaries are assumed to be of the opposite sex from the member.</p> <p>Male spouses are assumed to be 2 years older than females spouses.</p>
Beneficiary Age (Post-Retirement)	Members are assumed to be 3 years older than their joint annuitant.
Return of Unused Member Account Balance	The cash refund is explicitly valued.
Form of Payment	For active members, benefits are assumed to be paid in the form of a single life annuity since all optional forms are actuarially equivalent using the same interest and mortality assumptions used in the valuation.

## SECTION V - ACTUARIAL ASSUMPTIONS AND METHODS

### **A. Actuarial Assumptions (Continued)**

#### Data Assumptions

Members without a date of birth provided are assumed to be 30 years old. Pensionable pay for valuation purposes is assumed to be the greater of the current year's salary, the previous year's salary and \$5,000. Pensionable pay for active members hired in the current year is assumed to be the greater of annualized pay and \$5,000. Pensionable pay for valuation purposes for inactive members is assumed to be the greater of the two most recent years of salary history provided and \$5,000.

#### Assumption Changes Since the Prior Valuation

An experience study was completed in June 2016 resulting in an update to the following assumptions:

The inflation assumption decreased from 2.50% to 2.25% per year.

The payroll growth assumption decreased from 3.75% to 3.25% per year.

The future salary increase assumption decreased from 5.00%-12.00%, depending on service to 4.00%-11.00%, depending on service.

The investment return assumption decreased from 8.00% to 7.75% per year.

The active mortality assumption changed from the RP 2000 Mortality Table set back one year for males and six years for females, then projected to 2016 using Scale AA to 75% of the RP-2006 Total Dataset Mortality Tables with static projection to 2028 using the 2014 SSA Improvement Scale.

The non-disabled retiree mortality assumption changed from the RP 2000 Mortality Table set forward one year for males and no set back/forward for females, then projected to 2016 using Scale AA to the RP-2006 Total Dataset Mortality Tables with plan-specific experience adjustments and static projection to 2028 using the 2014 SSA Improvement Scale.

The disabled retiree mortality assumption changed from the RP 2000 Disabled Retiree Mortality Table to the RP-2006 Disabled Retiree Mortality Tables with static projection to 2028 using the 2014 SSA Improvement Scale.

The withdrawal assumption is a service-based table of rates. The rates from 0 to 13 years of service were increased to reflect recent experience.

The disability assumption is an age-based table of rates. The rates at certain ages were increased to reflect recent experience.

The retirement assumption is an age and service based table of rates. The rates at certain ages were increased or decreased to reflect recent experience.

The refund of contributions assumption was adjusted to reflect that active and inactive members who terminate with 5 or more years of service, but prior to satisfying the age and service requirements for service retirement, will select the option that has the greater present value between an immediate refund and a deferred annuity.

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SECTION V - ACTUARIAL ASSUMPTIONS AND METHODS

**A. Actuarial Assumptions (Continued)**

Assumption Changes  
Since the Prior Valuation  
(Continued)

An experience study was completed in June 2016 resulting in an update to the following assumptions (continued):

The dependent assumptions for active members (pre-retirement) were adjusted to reflect recent experience.

The beneficiary age assumption for retired members (post-retirement) was adjusted to reflect recent experience.

The return of unused member account balance assumption was changed to explicitly value the cash refund.

In addition, the Board adopted a new COLA policy during fiscal 2016 resulting in a decrease in the future COLA assumption from 2.00% per year to a variable, increasing assumption of 1.00%-1.50% over ten years beginning January 1, 2018.

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SECTION V - ACTUARIAL ASSUMPTIONS AND METHODS

**B. Assumptions Rationale**

Investment Return	The investment return assumption is based on an analysis completed by the PEERS investment advisor and an independent, high-level analysis completed by PwC using a "building block" approach that considered the target asset allocation from the Board's investment policy and capital market forecasts from various investment professionals.
Cost of Living Adjustments	The cost of living adjustment (COLA) assumed in the valuation increases from 1.00% to 1.50% over ten years beginning January 1, 2018. This COLA assumption reflects an assumption that general inflation will increase from 1.75% to a normative inflation assumption of 2.25% over 10 years. It is also based on the current policy of the Board to grant a 0% COLA whenever annual inflation, as measured by the CPI-U index for a fiscal year, is less than 2%, 2% COLA whenever annual inflation is between 2% and 5%, and 5% whenever the annual inflation exceeds 5%.
Other Assumptions	The Board of Trustees adopts actuarial assumptions, each of which individually represents a reasonable long-term estimate of anticipated experience under the System, derived from experience studies conducted every fifth year. The most recent comprehensive experience study was completed in June 2016. The economic and demographic assumptions listed previously in the report were reviewed and updated, where appropriate, based on the historical experience observed during the study and expectations for the future.

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SECTION V - ACTUARIAL ASSUMPTIONS AND METHODS

**C. Actuarial Methods**

The actuarial methods used in the valuation for funding purposes and noted below were selected and approved by the PEERS Board of Trustees. The actuarial methods are generally reviewed in conjunction with experience studies of the assumptions. In this way, the actuary provides guidance to the Board in selecting the methods. The actuarial methods used for financial reporting purposes and noted below are prescribed by GASB 67 and 68.

Actuarial Cost Method

The actuarial cost method is Entry Age Normal - Level Percent of Payroll.

The Normal Cost is calculated separately for each active member and is equal to the level percentage of payroll needed as an annual contribution from entry age to retirement age to fund projected benefits. The Actuarial Accrued Liability on any valuation date is the accumulated value of such Normal Costs from entry age to the valuation date.

Amortization of Unfunded Actuarial Accrued Liability

For funding, gains and losses occurring from census experience different than assumed and assumption changes are amortized over a 30-year period as a level percent of payroll. A new gain or loss base is established each year based on the additional gain or loss during that year and that base is amortized over a new 30-year period. The purpose of the method is to give a smooth progression of the costs from year to year and, at the same time, provide for an orderly funding of the unfunded liabilities.

Increases in the Actuarial Accrued Liability caused by changes in the benefit provisions are amortized over 20 years, as determined in the 2007 session of the Legislature.

For accounting, gains and losses occurring from census experience different than assumed and assumption changes are amortized into expense over the average expected future service of all plan participants (actives and inactive). Gains and losses occurring from investment experience different than assumed are amortized into expense over a 5-year period. The effect of plan changes on the plan liability are fully recognized in expense in the year in which they occur.

Asset Valuation Method

The Actuarial Value of Assets is a smoothed value of assets. The actuarial value at June 30 of the prior year is projected by increasing the amount by 8% interest, adding contributions with 8% interest for half the year, and subtracting benefit payments with 8% interest for half the year. 20% of the difference between the actual returns on market value for the year and the expected return from the projection of the prior year actuarial value, along with corresponding amounts from each of the prior four years, is added to the actuarial value.

For accounting purposes, market value was used.

Changes Since the Prior Valuation

There have been no changes in the actuarial methods since the June 30, 2015 valuation.

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SECTION VI - SUMMARY OF PLAN PROVISIONS

**SUMMARY OF BENEFIT PROVISIONS**

Page

A. Summary of Benefit Provisions

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SECTION VI - SUMMARY OF PLAN PROVISIONS

**A. Summary of Benefit Provisions**

Below is a summary of the plan provisions that are pertinent to the valuation herein and may exclude certain provisions that are not deemed relevant to our calculations. This summary is based on our understanding of the plan provisions set forth in the applicable statutes of the State of Missouri. If there is a discrepancy between the summary below and the applicable statutes, the applicable statutes shall govern.

Member Contributions	Half the total PEERS contribution rate. For fiscal year 2016, the total PEERS contribution rate is 13.72%.
Normal (Unreduced) Retirement	
Eligibility	Attainment of age 60 with at least five years of Creditable Service, or Completion of 30 years of Creditable Service at any age, or Age plus Creditable Service is at least 80.
Benefit	1.61% of Final Average Salary for each year of Membership Service. A year of Prior Service is treated as 0.6 year of Membership Service. Any person retiring prior to age 62 under the Rule of 80 or with 30 years of creditable service will receive an additional benefit payable to attainment of age 62. This benefit is equal to 0.8% of Final Average Salary for each year of Membership Service.
Compensation	All regular earnings as an employee of a PEERS-covered employer. Compensation or salary includes, but is not limited to, payments for extra duties, overtime payments and employer-paid medical, dental and vision insurance premiums for the member.
Final Average Salary	Average monthly salary over the Member's three highest consecutive years of service. Effective August 28, 2007, the maximum increase in the annual compensation used for the final average salary shall not exceed twenty percent.
Membership Service	Service while a participating member of PEERS. Service is measured each year in relation to minimum salary for 20 hours per week in the position for that year.
Prior Service	Service rendered in a covered position prior to November 1, 1965.
Creditable Service	Membership Service plus any Prior Service.
Normal Form of Benefit	Single Life Annuity  Options available include joint and survivor (50%, 75%, or 100%), term certain (60 or 120 months) and life thereafter, partial lump sum option (PLSO), and accelerated payment plan (APP).

SECTION VI - SUMMARY OF PLAN PROVISIONS

**A. Summary of Benefit Provisions (Continued)**

Early (Age Reduced) Retirement

Eligibility                      Attainment of age 55 and under age 60 with at least five years of creditable service.

Benefit                              Normal retirement benefit accrued to the date of early retirement, actuarially reduced from age 60.

Special Early Retirement Under Modified Formula

Eligibility                      Retirement at an age under 55 and with at least 25 years of creditable service but not eligible for the Rule of 80.

Benefit                              Based on a percentage of final average salary per year of creditable service. Percentages are as follows:

<u>Years of Service</u>	<u>Benefit Percentage</u>
25-25.9	1.51%
26-26.9	1.53%
27-27.9	1.55%
28-28.9	1.57%
29-29.9	1.59%

COLA Adjustments              The Board has established a policy of providing a 0% COLA whenever annual inflation, as measured by the CPI-U index for a fiscal year, is less than 2%, 2% COLA whenever annual inflation is between 2% and 5%, and 5% whenever the annual inflation exceeds 5%.

For any member such adjustments commence in the fourth January after commencement of benefits. The total of such increases may not exceed 80% of the original benefit for any member.

Disability Benefits

Definition of Disability        Incapacity for performance of gainful employment after completion of five years of creditable service and before age 60.

Benefit                              Lifetime benefit equal to 90% of accrued normal retirement benefit.

Form of Benefit                    If eligible, surviving spouse may elect a survivor benefit. COLA adjustments similar to those provided to retirees are provided on this benefit.



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SECTION VI - SUMMARY OF PLAN PROVISIONS

**A. Summary of Benefit Provisions (Continued)**

Vesting

Eligibility	Completion of five years of creditable service.
Benefit	Accrued normal retirement benefit payable at earliest retirement age based on service at date of termination. Benefit is based on formula in effect at commencement of benefit.

Death/Survivor Benefits

Refund	Refund of accumulated member contributions with interest.
Survivor Benefits	<p>If the member has at least 5 years of creditable service at date of death, the spouse may receive a survivor benefit based on 100% J&amp;S equivalent of the benefit accrued to date of death. The benefit may commence:</p> <ol style="list-style-type: none"><li>1. Immediately if member is eligible to retire at date of death, or</li><li>2. At a future retirement date of the deceased member.</li></ol> <p>The benefit may be reduced for early commencement if the deceased member would not have been eligible for unreduced retirement at that date based on service to date of death.</p> <p>COLA adjustments similar to those provided to retirees are provided on these benefits.</p>

Changes in Benefit Provisions	There have been no changes since the June 30, 2015 valuation.
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